DOCUMENT RESUME

ED 342 624 SE 052 045

TITLE	What Would Happen If... Numbers 1-12.
INSTITUTION	Tasmanian Education Dept., Hobart (Australia).
REPORT NO	ISBN-0-7246-13587
PUB DATE	87
NOTE	150p.; Some activity sheets contain small print. Best copy available.
AVAILABLE FROM	The Marketing Officer, Department of Education and the Arts, 71 Letitia Street, North Hobart, Tasmania, Australia 7000 ($A15.00).
PUB TYPE	Guides - Classroom Use - Teaching Guides (For Teacher) (052) -- Collected Works - General (020)
EDRS PRICE	MF01/PC06 Plus Postage.
DESCRIPTORS	*Biological Sciences; Elementary Education; *Elementary School Science; Foreign Countries; *Physical Sciences; Process Education; *Science Activities; Science Education; *Skills; *Teaching Guides

ABSTRACT

This document presents a set of 12 science activity collections (a total of 144 activities) gathered from periodicals and other sources in Australia. The content areas commonly covered in elementary school science lessons are represented by such activity topics as: what you can do with a leaf; climbing liquids; silkworms; shadows; chemical force; yoghurt; batteries and bulbs; making a solar water heater; ourselves; mirrors; small creatures; and smell and taste. Objectives, materials, and procedures are discussed in each activity description. A skills references is provided for the following skills: observing; inferring; classifying; measuring; predicting; using space and time relationships; recording/communicating; hypothesising; experimenting; and problem solving. (CW)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☒ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

H. HOCKING

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

SE

ED342624

WHAT WOULD HAPPEN IF .....
Numbers 1 – 12

Prepared and compiled by
Supervisor of Science
Curriculum Development and Evaluation
Education Department Tasmania Australia

SE052045

BEST COPY AVAILABLE

Published by
Education Department
Tasmania Australia
1987

ISBN 0 7246 13587

SKILLS REFERENCE

O = Observing; I = Inferring; C = Classifying; M = Measuring;
P = Predicting; S/T = Using Space and Time Relationships;
R/C = Recording/Communicating; H = Hypothesising;
CV = Controlling Variables; ID = Interpreting Data;
E = Experimenting; P/S = Problem Solving.

No. 1	P. 1	Science, Stamps and Learning	O,C,I,M
	2	Starting with a puddle	M,H
	4	The Drinking Bird	M,CV,H
	5	What can you do with a leaf	O,C,M
No. 2	8	Climbing liquids	O,M,CV
	10	Bottled Science	O,M
	13	Inter-relating science with other subjects	
	17	*Flowchart* - plastic containers	
	18	Tarzan's travels	O,M
No. 3	19	Mice	C
	20	Mangonels	M,R/C,H
	23	The seashore	O,C,M
	26	The pendulum	M,P,R/C,CV,ID
	27	Silkworms	O,M
	29	Recording a science experiment	R/C
No. 4	30	Rhubarb Champagne	M,CV,H
	31	Fruit Tingles	O,M,R/C
	34	Popcorn	O,H
	35	*Flowchart* - Shells	
	36	Making an electric quiz	I,R/C
	38	Cooking a hot dog	M,H
	40	Shadows	O,M,S/T
	42	Keeping animals in 'the classroom'	
No. 5	43	Chemical force	O,M,P
	44	Coloured layers	O,M,P,R/C
	46	Finger-prints	O,C
	48	Tree shake	O,C,R/C
	49	Paper strength	O,P,M,R/C
	50	Marble collisions	P,M,CV
	51	*Flowchart* - newspaper	
	52	Bitter lemon	M,H,CV
No. 6	53	Litmus? Don't need it	O,C
	54	Yoghurt	M,CV
	55	Magnetic force	M,P
	56	Finger-prints	O,C,R/C
	58	Paper spinners	M,H,CV
	59	*Flowchart* - snails	
	60	More marbles	M,P,R/C,CV
	62	Invertibrate Vivarium	O,CV,H
No. 7	63	Make a solar warmer	O,M
	64	Junket chemistry	M,CV,R/C
	65	Paper strength	P,M,R/C
	67	Paper spinners	R/C,CV
	69	Batteries and bulbs	

	71	*Flowchart* - batteries and bulbs	
	72	Hot coffee	M,CV,R/C
	74	A safe volcano model	O,M
	76	Science fun with cents	O,P/S
No. 8	77	Parachutes	CV,M,R/C
	78	Gyotako or fish printing	O
	80	Paper strength	P,M,R/C,CV
	82	Insulation	M,CV,R/C
	83	Wind measurements models	M,S/T
	85	Making a solar water heater	M,CV
	87	Paper planes	CV,M
No. 9	89	Ourselves	M,I,R/C
	90	Bonsai a tree	O,M
	91	Investigating - a method to start investigation	H
	93	Pollution watch	O,M
	95	Force or energy	M,P
	97	Science ideas	O,H,M
	99	Using space relationships	S/T
	100	What colour holds heat longest	M,R/C,H
	102	More & more marbles	H,P,M
	103	A return roller	H,M
No. 10	104	Blinking	M,ID
	106	Press and display seaweed	O,C
	108	Solar energy	M,H
	110	Rebus task cards	
	111	A land yacht	H
	112	Bicycles	M,R/C,S/T
	114	Mirrors	O,S/T
	115	Predicting	P
	116	Train-set science	M,S/T,I
No. 11	117	*Flowchart* - light and shade	
	118	Shadows	O,S/T,M
	120	Testing boat shapes	O,M,CV
	122	Balancing regular shapes	O,M,P
	124	Science with an egg carton	O,C,I,M
	126	How to find the centre of an irregular plane object	O,M,P
	127	The asphalt	O,S/T,I
	128	Small creatures	O,I,C,M,R/C,P
	129	*Flowchart* - beach environment	
No. 12	130	Nutrition activities	O,M,R/C
	131	Smell and taste	O,P,CV
	132	Testing milk	O,P,M
	134	Magnets and magnetism (unit box)	
	135	Propellers	O,M
	136	Broken objects archaeology	I,R/C
	137	Building and structures	O,P,CV
	138	Straw flute	O,M,P
	139	Snappers	O,M,P
	140	Straw tooters	O,M,P
	142	Straw buzzers	O,M,CV
	144	Evaluation	

Science, Stamps and Learning

Used postage stamps give students a chance to practise science skills. Stamps can give students the opportunity to apply the science processes of observation, classification, making inference, measurement and comparison of data. Give each student 20 to 40 used stamps, and try some inquiry questions, including:

Observation: Using a magnifying glass, what can you see that you cannot see with your eye alone?

Classification: How does the number of American stamps you have compare with the number of foreign stamps you have? What are some slogans on your stamps? How many ways can you divide your stamps into two groups based on a single property? What is the property you used to classify your stamps into two groups? What is the most common denomination of your stamps?

Inference: Were the stamps used on letters? What can you tell from the postmarks on cancelled stamps and envelopes? Which stamp has probably been transported the greatest distance?

Measurement: How many perforations are there along each edge of a stamp? What is the size of your stamps (in metric terms)? How long is your row of stamps? Is the number of notches per centimeter the same on each edge? Is the number of notches per centimeter the same for different stamps?

Comparison: How does the printing detail in stamps compare with the detail in paper money? How many different shapes can you make using your stamps?

Interdisciplinary Activities: Design a stamp to commemorate a significant event in science. How many different presidents are on your stamps? What can you find out about each president? Make a report on a person or event on a stamp. Pretend you are a stamp. Tell of your travels. How would you find out the value of your stamps? Which of your stamps is the most valuable? What would it cost to purchase your stamps if they were new?

Reprinted from *Science and Children*
February 1979

STARTING WITH A PUDDLE

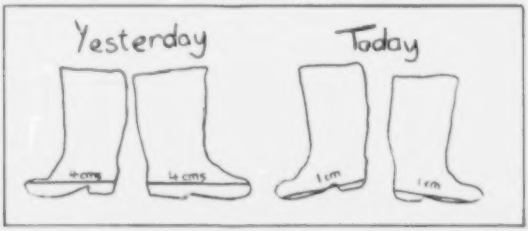
Reprinted from ASE Primary Science
Number 1 Spring 1980

Some children found a large puddle in the playground. When the teacher asked "How deep is it?" Chris stood in the puddle while his friend marked the level of the water on his boots. In the classroom the two children drew round the boots , cut out the shapes and marked the water level.

"Here are my wellingtons. I stood in the big puddle by the pipes and I came and measured how deep the puddle was."

Chris

A second question from the teacher, "I wonder how deep it will be tomorrow?" was all the prompting they needed to repeat the work on the following two days.



After the teacher had talked to the children about what had happened to the water, Chris wondered about it.

Where did the the puddle go? Perhaps it evaporated or it was splashed away or the wind blew it away Maybe it soaked into the ground. Chris

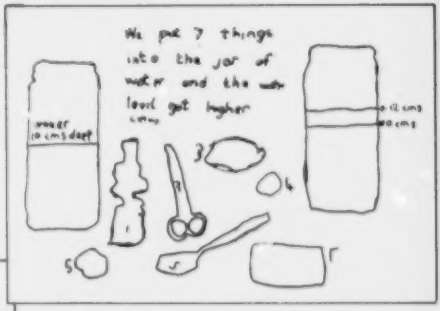
Other children were interested in the puddle and started their own water investigations. The teacher encouraged their work by providing materials and equipment, and by questioning and prompting the children. She was always interested and available for discussion.

Peter, one of the youngest children, wrote
"Two and a bit cupfuls of water filled the jug"

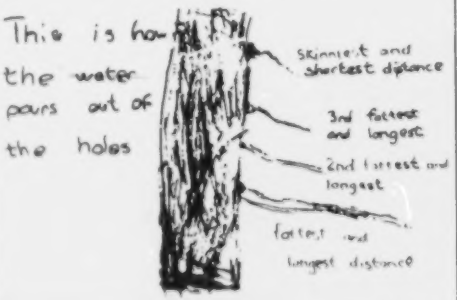
Linda found that
"an empty bottle with no lid floated but it sank when we pushed it under the water because the water ran in"

Peter and David added soil to a jar of water. The next day they wrote

Today the soil looks like sad sand and it has sunk to the bottom It is 6 centimeters deep. on the surface are all the little lighe sticks which dont sink



The teacher gave some of the older children a squeezy bottle with four holes in it.


This is how the water pours out of the holes
Skinniest and shortest distance
3rd fattest and longest
2nd fattest and longest
fattest and longest distance

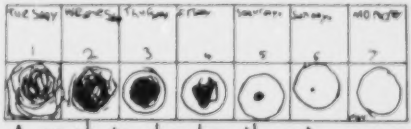
Malcolm used a pipe to transfer water

All the water in the red bucket ran down the tube into the yellow bucket

Samantha put some water in a jar with a plate on top and later found that

There are lots of little drops of water on the side of the jar

I put a lot of water in a dish today and then I put it on the bench we are going to find out how long it takes to evaporate (evaporate)



A graph to show how the water evaporated

The teacher thought that each experiment was valuable in itself: if one led to another; it was because the children thought of it for themselves, perhaps after talking to her.

THE DRINKING BIRD

This novelty item, when correctly set up, swings back and forth pausing regularly to dip its beak in the water.

What would happen if the system was set up in:

a) a cool place
b) a sunny place
c) a draughty place
d) a warm place.

?

What would happen if the water was replaced by another liquid such as:

a) brine
b) methylated spirits
c) vinegar
d) warm water.

?

What measurements can we make about the bird or its behaviour?

Answer these questions and you are on the way to understanding the basic question —

'Why does the bird lean over to drink?'

WHAT CAN YOU DO WITH A LEAF?

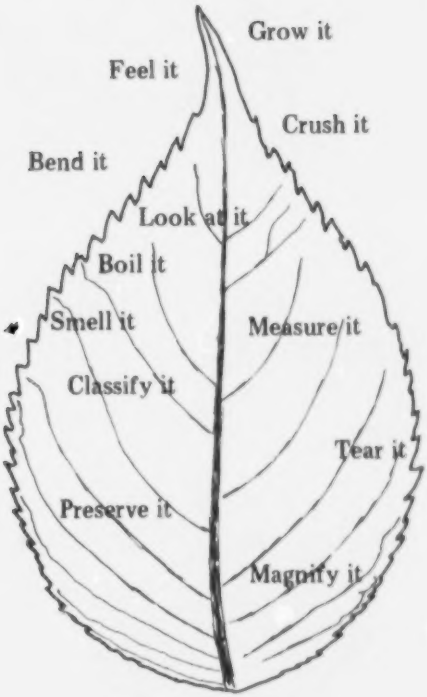
Elementary students often study the leaf as a primary plant structure. After a unit on plants, students will typically be able to state that the leaf is one of the major parts of a plant, and that it is the part which makes food. These are worthy objectives, but plant leaves may be studied in more depth. Some examples of questions which may be posed about leaves to involve children in using science processes follow:

Observing — What is the shape of the leaf? Is it long or wide? Are the edges smooth? notched? How many large veins does a leaf have? What is the organization of the veins? What color is the leaf on the bottom as opposed to its top? Do the top and bottom surfaces feel different? If so, how? What is the odor like? Do the leaves tear easily on lines or in an irregular pattern? Are all the leaves on one plant the same size? Does the leaf have a stem? Will the leaf bend without breaking? What effects does heat have on a leaf? How many leaves are there at a particular node along a stem? Do all kinds of leaves change color at the same time of year? How many leaves of different texture can you find?

Measuring — How long is a leaf? How wide? How long is the stem of a leaf? How far apart are the nodes? How far is it from the ground to the lowest leaf (average) on a maple tree? on an oak tree? How long is a large vein in a maple leaf? What is the total length of all the large veins?

Classifying — How are oak leaves different from wild cherry leaves? from maple leaves? Can you classify leaves into two or three groups on the basis of particular characteristics? Separate the large groups into smaller groups using other characteristics. What relationship can you see between these characteristics and a simple plant key?

Many specific activities are possible using the leaf. If microscopes are available, tear the leaf in a twisting fashion so that the lower epidermis may be studied and the stomata (tiny pores in the lower epidermis where gaseous exchange occurs) observed. Using different kinds of leaves you may even be able to prepare a bar graph



What can you do with a leaf?

showing the number of stomata per given area of leaf surface on different kinds of plants.

In rural areas where trees are abundant, students are frequently encouraged to prepare a leaf collection. What is the best way to mount leaves as they are prepared for a collection? How long should they be pressed in order to insure that they retain their color for at least the full school year? Asking questions such as these will serve to encourage children to experiment and develop their own techniques.

Many experiments involving leaf size and number are possible. Some elementary teachers grow beans, peas, and other common garden plants in their classrooms. Raise the following questions to encourage experimentation by children: How does temperature affect leaf size? Does the amount of water which beans (or peas) receive affect either size or number of leaves? Does the type of potting soil used affect the water requirements of garden plants?

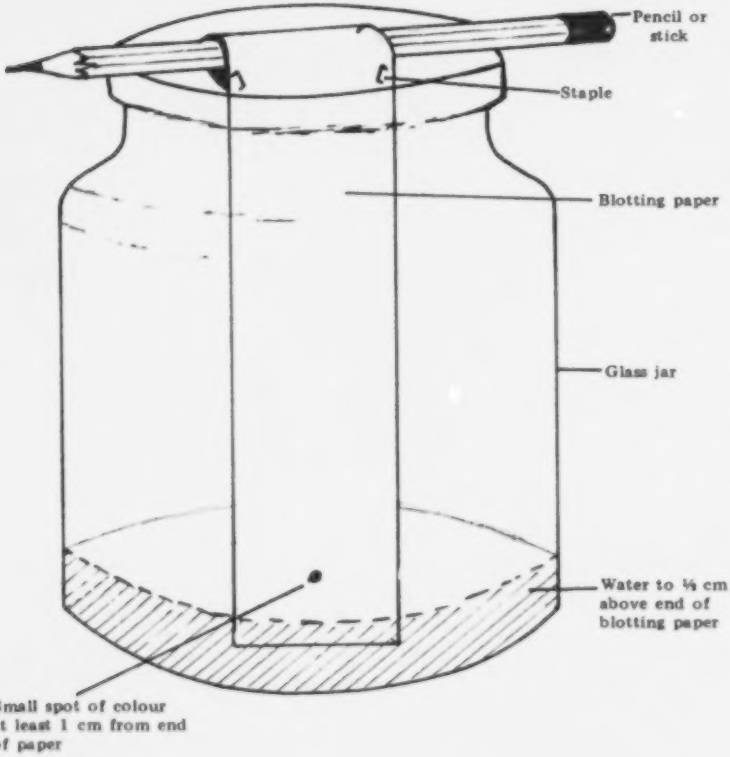
It is possible to remove the chlorophyll from leaves by boiling them in alcohol. (Note: Alcohol fumes are flammable. Place an alcohol container in a larger container of water and heat.) If a leaf which has been treated this way is covered with tincture of iodine and left for several minutes, the leaf turns a deep blue or violet color. This positive test for starch shows that the leaf is actually a food factory for the plant.

Children in intermediate grades quickly devise their own experiments if encouraged to do so. And if a few teachers have not discovered the value of small discarded milk cartons as containers for growing plants, they should certainly do so now. The leaf is a resource which can be used by many elementary teachers to improve the teaching of science. Try studying leaves.

Reprinted from *Science and Children* September 1979

CLIMBING LIQUIDS . SEPARATING COLOURS

Ian Winter


Pencil or stick
Staple
Blotting paper
Glass jar
Water to ⅛ cm above end of blotting paper
Small spot of colour at least 1 cm from end of paper

When one end of a strip of blotting paper is immersed in water, the liquid will climb up the paper, through the pores in the paper, by capillary action.

Use this principle to conduct an inquiry based activity along the following lines:

1. *Which of the following liquids moves fastest — cold water, hot water, cooking oil, salt water, methylated spirits, soapy water?*
2. *By marking the blotting paper in 1 cm intervals and using a stopwatch, find out if the rate of upward movement is constant or variable, e.g.*

1st cm _____ *seconds*
2nd cm _____ *seconds*
3rd cm _____ *seconds*

} *potential for graph work*

*The diagram illustrates a procedure for testing the colour make-up of various dyes such as texta-colours. As the liquid moves up the colour components more at different rates. After climbing a few centimetres, the different colours can easily be distinguished. Use this technique for answering the following questions:

3. *Which colours in the set contain only one dye? Which contain two dyes? Which contain three or more dyes?*
4. *Does the brown (black, orange, green, etc.) from brand A contain the same colours as the brown from brand B?*
5. *What would happen if we use methylated spirits instead of water?*
6. *Will water insoluble felt pen colours separate with methylated spirits?*

Other questions to answer include:

7. *What would happen if we used toilet tissue or paper towelling instead of blotting paper?*
8. *What would happen if two primary colours are superimposed to make one coloured dot?*
9. *Which colours move fastest?*

BUT REMEMBER WHEN DESIGNING AN EXPERIMENT TO ANSWER A PARTICULAR QUESTION, CONTROL YOUR VARIABLES.

* See previous page

BOTTLED SCIENCE

Alvin Cooke

Trying to find at the beginning of the year a science unit that would stimulate the children, keep them interested, reinforce scientific skills, yet leave room for individuality and integration with other subjects led me to work with bottle gardens under the general heading of the Water Cycle.

Each child was asked to bring a clean, clear glass bottle for his or her garden. For those that could not, a trip to a local club provided me with a number of 'empties'. The type of bottles ranged from cordial bottles to large wine flagons, but spirits bottles seemed to dominate. Tools required were few: a paper tube (each made their own) to fit through the neck of the bottle, and a piece of wire slightly longer than the bottle bent on one end to make a hook. Also, plenty of newspaper or plastic to cover the floor was at hand.

The materials consisted of:—
(a) stones (or gravel),
(b) potting mix - a light humus mix,
(c) ground charcoal,
(d) potting soil and plant clippings.

The children conducted six simple steps as follows:

First a layer of stones was dropped into the bottle to cover the bottom. Next, a layer of potting mix was poured in using the paper tube. This was smoothed with the wire tool after which a thin layer of charcoal was introduced through the tube. Fourthly, a layer of potting soil was poured in and smoothed. Ideally the contents should have taken a third of the bottle volume, but large individual differences occurred.

Plant cuttings (two or three per bottle) were then dropped into the bottle and pressed into the soil. These cuttings consisted of plants which, hopefully, would take root fairly quickly such as ivy, Wandering Jew, begonia, etc.

Finally two tablespoons of water were added and the opening sealed with either a cap or masking tape.

These bottle gardens were placed in a position to obtain plenty of sunlight. Recording of observations of change were noted once a week. Most recorded observations of growth in their bottle, but there were some whose observations were of death and decay. Of the thirty bottle gardens planted, six failed. Reasons are hard to find but most probably lie with the plant cuttings themselves.

Integration with other subjects was mainly in the art and craft area, especially with the making of macrame hangers. Here was another skill that the children enjoyed and took great pride in.

Now, six weeks later, observations are still being recorded and macrame holders are still being made! Although little of the actual water cycle has been discussed there has been a good foundation laid for later work.

Observations

Matthew 6C 4/3/80
There is a lot of condensation at the top of the bottle. The cactus plant I think has died. My Aluminium Plant has grown some new roots, it has also grown a new leaf. The soil still looks wet.
11/3/80
No change except that I can see some more roots.
17/3/80
Heavy moisture on the inside of the bottle.
24/3/80
My Aluminium Plant has grown a new leaf and my cactus plant has rotted away.

* * * * * *

Brendan 6C 4/3/80
There is a lot of condensation in my bottle. My Wandering Jew has grown roots. The cactus has grown stronger.
My Wandering Jew has grown a bigger root system. My plant has grown new shoots.
My Wandering Jew is going brown on the leaves. The cactus is

growing moss on it.
My plants are dead and have got moss on them.

* * * * * *

Andrew 6C 4/3/80
A fortnight later. The ivy has two new shoots, one is only a bud but one has a stem and the new leaf will open soon. The Spider Plant has a lot of new shoots and leaves. I guess it would have grown ¼ of its size again since it was planted.
17/3/80
The ivy has one more new leaf and the Spider Plant is taking over the bottle. Condensation reduces vision into the bottle. The soil looks moist, none of the plants have died.
24/3/80
The new leaves have opened and there is another bud coming on the ivy. The Spider Plant is still spreading, you can see two roots on the side of the bottle.
1/4/80
Another leaf has just about opened on the ivy to make a total of 3 new leaves since I planted it. The Spider Plant is up to the neck of the bottle. You can see three roots are on the side of the bottle.

* * * * * *

Shanlee 6C 4/3/80
There have been two changes in my bottle garden. My first change is the condensation and the second change is that my cactus has grown at least a centimetre or more. All my plants are looking healthy.
11/3/80
The only change in my bottle garden is that my cactus plant has grown.
17/3/80
My cactus plant has at least grown a centimetre or more. All the other plants in my bottle garden are very healthy. There is also a bit more condensation.
1/4/80
All the plants in my bottle garden are healthy. My cactus has grown a bit. But nothing else has.

INTER-RELATING SCIENCE WITH OTHER SUBJECTS

Edna D. Main

Does educational accountability with so many skill checklists make you feel the need to teach only basic or minimal skills? As more teachers work toward the limited outcomes of national, state, and county objectives, children are being turned off to science and other subjects. More and more testing of achievement in specific skills emphasizes the test scores. The drive for accountability has encouraged separate subject teaching with drills and tests that require simple recall of facts, thus fragmenting knowledge. Each subject has its own time slot, and few attempts are made to relate different subjects. Raising test scores — the quantity, not the quality — seems to be the goal.

Children do need to learn basic skills. But learning only facts does not help children see relationships among subjects or develop their abilities to think broadly. Children need interrelated experiences which make learning effective and meaningful. Research studies show that when subjects are interrelated, children increase their insight, understanding, and motivation. Furthermore, students' attitudes toward learning are more positive and their achievement is higher. (1,2,4,5,7)* Subjects can be interrelated using science as the core. Since science strongly motivates children in an elementary classroom, a science unit can interrelate many different disciplines.

In my third-grade classroom, a unit on the solar system was interrelated with children's current interests in fictional space exploration, encounters, and space colonies. Since many children had seen movies, TV programs, and books on the subject, we were able to relate science to social studies, reading, creative writing, research, math, art, and music.

Given the information in the text, active discussions at first centered around the possibilities of life on other planets in the

* See References.

solar system. Since the science textbook we used had been published in 1968, the chapter on the solar system did not include the Apollo landing on the moon or recent discoveries about the planets. To continue our active discussions about life on other planets, we decided that we needed more information.

Children viewed current films and filmstrips and shared information they found in magazine and newspaper articles. As they updated the information in the text, they understood that 'facts' changed as new information became available. They visited the planetarium at the Jacksonville, Florida, Museum of Arts and Sciences and gathered more information by taking a 'Grand Tour of the Solar System' which simulated a trip through space.

The children found an article on plans for a new space colony between Earth and the moon. The slogan, 'Conserve Earth, Colonize Space,' in a magazine article became a large graphic stretched across one of the walls in the classroom. Students discussed who wanted to go to the new space colony, why, and what supplies would be necessary to live there.

The children wrote reports and made dioramas, posters, or models of the solar system. Reports and data were shared and discussed for similarities and differences. Students asked what year books were published, comparing information in new and old publications for accuracy.

Because visualizing the planets' sizes was difficult, students decided to hang the planets in proportionate sizes from the ceiling. From descriptions in our text, we began planning how to make the sun about seven metres in diameter to be in proportion to the other planets. Mercury would be 25 centimetres, Jupiter 74 centimetres. Seven metres of the windows along one side of our classroom would be the sun; the planets would hang as mobiles.

Students chose reed, construction paper, colored tissue, tape, and glue for materials. All agreed to make the planets proportionate to the sizes stated in the text. Students had the most trouble making rings that looked right for Saturn and Uranus.

Other activities from the unit on the solar system included discussions in which children imagined how it would feel to be the first person to walk in space or travel to the moon, to move in a place where there is less gravity, to live in outer space, and what kinds of people would students want to have with them. Children listened to the sound track from the movie 'Star Trek', letting their imaginations wander.

For a creative writing unit, I asked children, 'Imagine that you could go to any planet in the galaxy. You are looking for another planet with life on it. Where will you go? How will you get there? Name your planet. Does it have a sun? What kind of life did you find on your planet? Describe it. What did you do there? Will you stay on this planet or return to Earth? Why? How will you get back to Earth if you come back?' The stories written and illustrated were long and imaginative, containing conclusions drawn from readings and discussions interwoven into the stories. Many wrote that their planets were in another solar system, about the same distance from their sun as we are from ours.

First- and second-grade classes that were beginning to study the solar system visited our classroom. We presented an overview of the solar system, shared our displays, answered many questions, and presented a planetary play. (3)

From a factual quiz at the end of the unit and my observations, I knew these third-grade children had learned more from their interrelated study of the solar system than from most separate subject units in the curriculum. Children had been motivated to learn on their own, enlisting help from the teacher, media center specialist, and parents. Following their natural curiosity, children had become more open-minded and had found that knowledge grows and changes rapidly. The children had worked well together on reports, creative writing, and art projects and had developed positive attitudes toward learning.

No theory of education or teaching method works in all instances. The teacher's love, effort, creativity, education, and background help motivate children to learn. Experience shows that children

need both direct teaching of subjects and experiences which interrelate subjects to learn basic skills. (6) Simply raising standardized test scores and meeting state or county performance objectives will not teach children the skills they need to think broadly and see the connections between subjects.

References

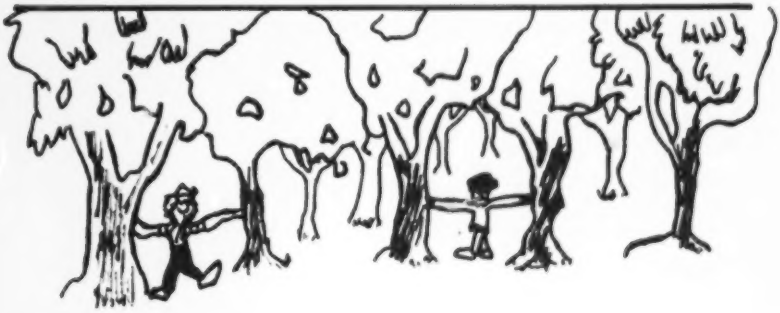
1. Cacha, F.B. 'Children Create Fiction Using Science.' *Science and Children* 15:21-22; November/December 1977.
2. Hayes, D., M. and Smith. 'Singing, Songing, Belonging.' *Teacher* 93:82, 85-86, 89; October 1975.
3. Hosford, B., and C. Keller. 'Planetary Puppets.' *Science and Children* 17: 44-45; October 1979.
4. Lehane, S., and M. Peete. 'The Amazing Adventures of Erik Stonefoot.' *Language Arts* 54:395-400; April 1977.
5. Main, E. 'Enjoyment, Interest, and Achievement Levels of Third Grade Students in Separate Subject and Interrelated Subject Units in Science and Social Studies.' Unpublished master's thesis. University of North Florida, Jacksonville, Florida. 1979.
6. Ragan, W.B., and G.D. Shepherd. *Modern Elementary Curriculum.* Holt, Rinehart and Winston, New York City. 1977.
7. Swisher, J. 'The Effects of an Interdisciplinary Instructional Program Upon Attitudinal Change of Seventh Grade Students with Varying Ability' (Doctoral dissertation, University of Virginia, Charlottesville. 1974). *Dissertation Abstracts International. 234,* 4951A-4952A; 1975. (University Microfilms No. 74-4673, 183.)
8. Tanner, D. and L. *Curriculum Development.* Macmillan Co., New York City. 1975.

Reproduced with permission from *Science and Children*, February 1981. Copyright 1981 by the National Science Teachers Association, 1742 Connecticut Avenue, N.W., Washington, D.C. 20009.

This map is one of several produced at a Northern Region seminar 'Leadership in Primary Science'.

Ian Pattie
Northern Region

TARZAN'S TRAVELS



Requirements: Closely wooded area.
Stopwatch or watch with a second hand.

The aim of the game is to stretch from tree to tree, touching as many trees as possible, in a set time.

You MUST always be touching one tree at all times. Once you let go to stretch to another tree you are out of the game.

You MUST NOT count the same tree twice, although you may touch the same tree twice.

You MUST count aloud.

- *How many trees can you touch in 10 seconds, 15 seconds, 30 seconds?*
- *Try again. Can you improve your score?*
- *Try different areas. What can you discover about tree density?*

Nel Smit, Molesworth.

MICE

Gaynor Ralph Devon Community College

Mice are sensitive, intelligent creatures and when kept in captivity need all their requirements provided, as they cannot go off and find their own.

Food

Mice are rodents and one of the characteristics of these animals is that their front teeth (the incisors) keep growing all their lives. This is very helpful for them as their teeth never wear out. This also creates a problem in captivity if they can't gnaw away because eventually their teeth will grow too long for them to get food in their mouths and they will starve. So wood must be provided in the cage for this purpose. Mixed bird seed is a good basic food to leave in a container. Fresh water every day. Also fresh fruit and vegetables, wholemeal bread, cheese, fruit cake are good extras to offer. Not all at once because there would be too much food and it would become boring. Just leave little bits of something each day and remove what is not eaten the next day. Decaying food is unpleasant and the mice cannot move away from it. They like variety in their diet just as we do and for them to stay healthy they must have their vitamins too.

Care

The cage should be cleaned at least once a week and the floor of the cage covered with shavings, paper or pine needles. Never sawdust, it gets in their lungs and causes respiratory diseases. They need nesting material — paper or cotton wool and somewhere private to sleep — like inside a cardboard box. They also like variety in their playground — tunnels to run through, twigs to climb and wheels to turn.

Reproduction

Gestation is three weeks and fertilization can take place again in the first 24 hours after birth of the litter. After this the mother does not mate again until the babies are weaned, which is three weeks. The number of litters can be controlled by removing the male at these times.

Ideally a new mother and litter are best isolated from the other adults and young.

MANGONELS

NB The idea comes from *Science 5/13, Models and Toys.*

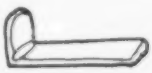
The mangonel was an ancient siege weapon, known as far back as 700 B.C., used for battering city walls and castle gates. Some versions could hurl a 25 kg stone 400 metres.

To make a model mangonel, you will need:

a flat block of wood, 10 cm wide and at least 30 cm long
a wooden peg
2 rubber bands
2 large nails
3 small nails
an ice-cream stick
a pin
some strong glue

STEP 1 — Making the Firing Arm

1. Make a light cut about 1 cm from the end of the ice-cream stick.



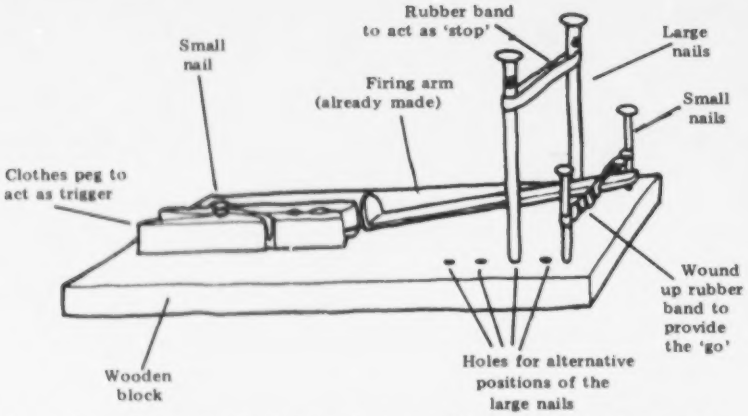
2. Carefully bend the end up and glue in position.

3. Stick the pin in the end and glue in position.

4. Leave until glue sets.

STEP 2

To 'energise' the mangonel requires two people, one holding the ends of the rubber band, the other winding the stick (count the windings in case it needs to be set up again in the middle of the activity). When sufficient tension is achieved, carefully place the ends of the band over the small nails, ensuring the stick will travel in the correct direction when released.


Rubber band to act as 'stop'
Large nails
Small nail
Firing arm (already made)
Small nails
Clothes peg to act as trigger
Wound up rubber band to provide the 'go'
Wooden block
Holes for alternative positions of the large nails

1. a) Get 7 small pieces of ammunition. *(Centicubes make good ammunition, also plasticene).* These should have masses of 1g, 2g, 3g, 4g, 6g, 8g, 10g.

   b) Have 5 shots with each piece of ammunition. Measure each shot and record the results on the table below.

	1 g	2 g	3 g	4 g	6 g	8 g	10 g
Shot 1							
2							
3							
4							
5							
Average distance							

   c) Is the range always the same when you use a 1g piece of ammunition? Why?

   d) Make a graph showing the average range for each piece of ammunition used.

e) What would you expect the average range to be if your ammunition had a mass of 7 g? 9 g? 15 g?

f) How does the mass of the ammunition affect the range of the mangonel?

2. Experiment with your mangonel to see how many different ways you can find to alter its range. *(Examples are — strength of rubber band, position of large nails, tilt of mangonel, etc.)*

3. Observe closely the path of a piece of ammunition from side-on.
Draw a diagram showing this.

4. According to the South Trowutta Book of Records, the Tasmanian record for a mangonel is seventeen metres.
Can you beat this with your mangonel?

Lachlan Wright

THE SEASHORE

This theme can be covered in many ways in the classroom with integration of science, maths, social science, language, drama and movement, and art. However, don't try and make the sea a theme if you can't organise a visit! This may be difficult for country schools, but at least one excursion should be possible.

Encourage the children:

(a) to develop an awareness of the seashore environment as a whole;
(b) to treat animals and plants carefully and refrain from disturbing their natural habitat;
(c) to collect only dead specimens or a few live specimens with which to stock an aquarium.

Encouraged in these ways, children should begin to become more aware of the meaning of conservation.

HERE ARE SOME SUGGESTIONS:

First Visit
(Don't forget to check the tide — it may be very disappointing if rock pools etc. can't be seen.)

1. Children should be encouraged to use all their senses, sight, hearing, touch, smell and, to a lesser extent, taste.
   (a) Sight — (i) Look up at the sky and clouds.
   (ii) Look around at the horizon and cliffs.
   (iii) Look down at the sand, sea, tracks, tide-marks and waves.
   (b) Hearing — Listen to the wind, waves, birds, other children, boats, etc.
   (c) Touch — the sand, water, shells, seaweed, rocks.
   (d) Smell — the sea, seaweed, dead animals and plants.
   (e) Taste — sea water, possibly seaweed, outside sea shells.

2. Collect sand, shells, rocks, seaweed, other plants and animals. Take care not to collect more than one of each living creature, and then only if you have a sea water aquarium in which to put it.

Greater numbers of shells and rocks can be collected and used for developing skills such as classifying (shape, size, colour, texture).

On subsequent visits you can concentrate on particular aspects of the beach and investigate them in greater depth.

SUGGESTIONS FOR MORE DETAILED WORK:

A. Study of rock pools

1. Divide the children into groups of three or four.
2. Each group selects a rock pool:
   (i) notes its position, with relation to the surroundings;
   (ii) examines the water and plants and animals living in it;
   (iii) takes the water temperature;
   (iv) sketches the pool and marks the position of plants and animals by numbers.
3. Ask each group to identify the plants and animals they find.
4. Return to the beach each week on the same day for at least six weeks. Be careful to check the tide, so the rock pools will be uncovered, or nearly so. Ask each group to locate their pool and repeat their observations. In particular, ask them to sketch the pool and mark again the position of plants and animals.

At the end of the period the children should all have a record of the pool and the changes which have occurred from week to week. Using this information, the class can discuss a range of questions, for example:

(a) Why were there more animals in week 1 than week 4?
(b) Why did the seaweed disappear?
(c) What made the water cloudy in week 5?

Note: you will need sketch pads, pencils and books for identifying plants and animals, for example, *Beach Life*, by Janet Somerville.

B. Survey of beach in winter

1. Visit the beach at the same time each week.
2. Note differences in:
   (a) overall appearance
   (b) tide situation
   (c) wind direction
   (d) wave direction
   (e) temperature of water
   (f) currents — direction
   (g) phase of moon
3. Try to measure differences in tide-marks from week to week. Take a siting of some landmark and work from there.
4. Later check with the Marine Board for actual statistics for the period studied, and compare them with the results obtained.

Note: you will need thermometers, measures and a flag or pole to determine the wind direction.

Daphne Prentice

THE PENDULUM

Ian Winter

Some activities involving: measuring
predicting
interpreting data
controlling variables
experimenting
graphing

To set up a pendulum, you need string, a ruler, a stopwatch, a lead weight (small fishing line sinker) and a stand of suitable height. A chair atop a desk will provide all the height you need. A book holds the ruler from falling as the weight is suspended from the end.

1. Adjust the length from swinging point to middle of weight to be exactly one metre. How many complete swings in one minute? (One complete swing is back and forth — count 'nought' as the weight is let go from a small arc.) You should find thirty swings to the minute!

2. Ask the children to predict answers to the following questions:
   a) What would happen to the number of swings in one minute if the weight is replaced with one twice as heavy? Having obtained their responses, let them design their experiment to find out. (No difference)
   b) What would happen if we start off with a wider arc? Predict, experiment and discover.
   c) What would happen if the pendulum is made longer? Predict, etc.

3. Ask students to graph the data from (b) and (c). Can they use the graph to predict the period of swing of an untested length? Can they predict the length that will give sixty swings per minute?

4. This activity can be extended to include studies of time and time-measuring devices plus poems and stories with time-based themes.

SILKWORMS

October is the time for silkworms.

Things to do

(a) Obtain some eggs.
(b) Put the eggs in a refrigerator and bring them out only when the mulberry trees are in leaf.
(c) If mulberry leaves are not available, obtain some lettuce instead.

When the eggs are hatching

(a) Shirt boxes are ideal containers, the plastic lid can protect the worms.
(b) As they hatch, the small black worms can be moved onto leaves by using a camel hair brush. Later on, when they are larger, the worms can be moved using your fingers.
(c) Have a stereoscopic microscope handy, so children can examine the eggs and newly hatched silkworms. Paper and pencils should be available for sketching.

As worms grow

(a) Always feed the worms on dry leaves.
(b) Clean out the containers frequently.

Activities for children

(a) Make charts for:
    i) population count;
    ii) measurement of growing worms;
    iii) when spinning of cocoons start.

By giving children the opportunity to have silkworms in the classroom, they can practise the process skills of observing, inferring, measuring, communicating and recording. It will probably also extend into the social science area of the silk-making industry.

For the teacher

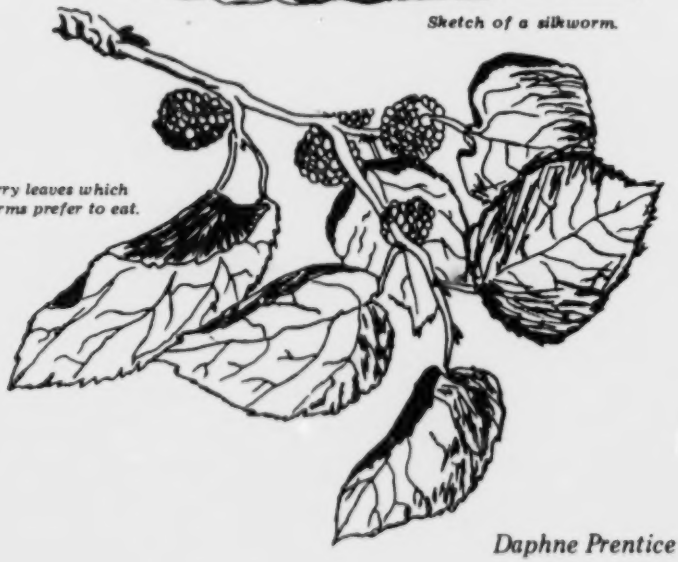
All the silkworms should have spun cocoons by the end of Term III, so if you and the children enjoyed having them, please take

the cocoons home and wait for the moths to hatch out in early January. The moths don't eat and after mating they soon die so they are no trouble! Put the male (small) and female (large) moths in a clean shirt box and soon you will have hundreds of eggs ready for next year.

Good luck.

Silkworm eggs available from NW Science Resource Centre.

Sketch of a silkworm.



Mulberry leaves which silkworms prefer to eat.

Daphne Prentice

RECORDING A SCIENCE EXPERIENCE

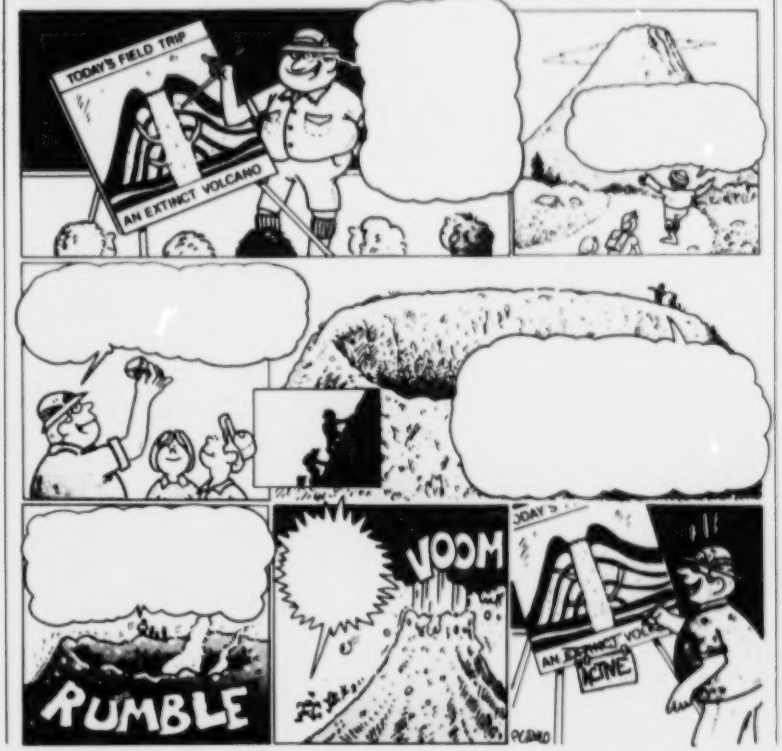
The journal 'Science and Children' contains many useful ideas. At primary level we should be wary of using stereotyped methods of recording a science experience. Below is reproduced one idea from the journal which could be applied in various ways.

Balloon Talk

"Balloon talk," based on Lawrence Bellipanni's and Kathy Casey's idea for teaching the metric system, lets students use humor in exploring science concepts.

Volcanoes

Imagine you have a volcano near your home. Take an imaginary walk to the top and look over the rim of the volcano's quiet crater. How can you tell whether it is active, dormant or extinct? Examine the pumice and dust on the slope of the volcano. Suddenly, the ground rumbles under your feet. What's happening? How do you think the internal structure of the volcano is changing? As you scurry down the mountain side, think about what new information a scientist would have about your volcano. Use this month's 'Balloon Talk' to express your encounter with a volcano. Send your funniest cartoons, minus the ash, to *Sci*. We will publish them in future issues.



Reproduced with permission from *Science and Children*, September 1980.
Copyright 1980 by the National Science Teachers Association, 1742 Connecticut Avenue, N.W., Washington, D.C.

BEST COPY AVAILABLE

Rhubarb Champagne

Changes occurring in chemical reactions are functions of the ingredients and time.

Ian Pattie has been teaching chemistry to infant classes using the following recipe for a delicious drink.

1 kg of rhubarb, sliced into 2 cm lengths
1 kg of sugar
1 lemon — sliced
5 litres of water
260 mls of white vinegar

} *or a multiple thereof*

Throw all ingredients into a clean container e.g. a plastic bucket.

Leave in a warm place for 48 hours — or to whatever degree of fermentation required.

Bottle after straining or filtering through a cloth.

Leave for 14 days.

Serve very chilled.

The variables:
- Amounts of ingredients.
- Time in bucket.
- Time in bottle.
- Temperature of 'warm place'.
- Effectiveness of strainer.
- Brand of vinegar.

In short: 'What would happen if . . . ?'

Fruit Tingles

D'Ayrne Dransfield, Grade 4T, Warrane Primary School.

An Experiment 1-4-1981

1. Expeciment
To find out what happens when we put a fruit tingle in water

2. Hypotheses /or our guesses as to what might happen

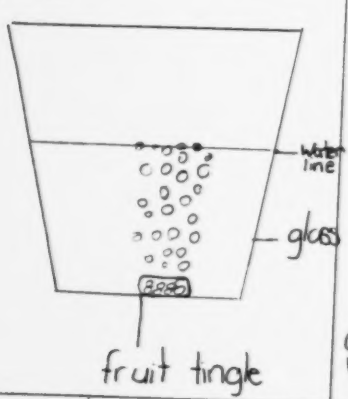
1. The fruit tingle will dissolve (Janet)
2. The fruit tingle will fizz (D'Ayrne)
3. The water will change to the coulour of the fruit tingle. (Damon)
4. The fruit tingle will float for a while then sink. Jeremy
5. The fruit tingle will go soft. (Dale)
6. The fruit tingle will sink and not dissolve. (Darrel)
7. The fruit tingle will sink and then dissolve Gary

What we did

1·45. Mrs Tate put a fruit tingle in a glass of water the fruit tingle sank to the bottom whith all bubbles rising off of it.
1·56. The fruit tingle is loosing its colour.
1·58. The fruit tingle is coloaring the water.
2·00. The fruit tingle is dissolving.
2·05. More bubbles are rising.

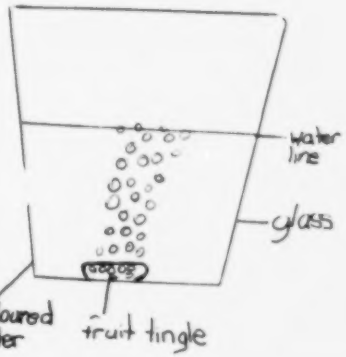
Stage 1

1·45



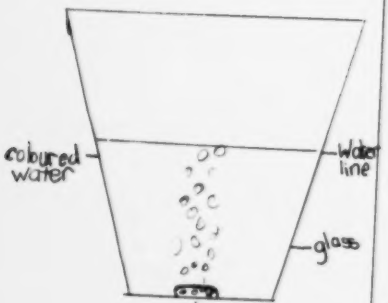
Stage 2

1·58



Stage 3

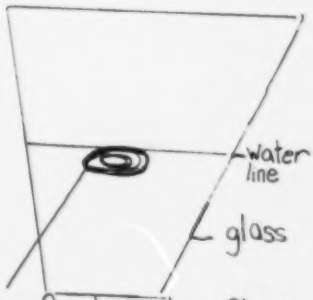
2·00



The fruit tingle is dissolving

Stage 4

2·22



The fruit tingle floated to the top

37

2:00. From 2.00 to 2.13 the fruit tingle fliped over and over 13 times.
2.09. The water is getting very cloudy
2.14. The fruit tingle floated up and down
2.14 The fruit tingle flipped while it floated at the
2.18. The water is cloudy and pink
2:20. The fruit tingle has broke in half
2.22. The fruit tingle is dissolving fast.

What we found out
We found out that Janet, Damon, and Gary were right when they guessed what would happen when Mrs Tate put the fruit tingle in a glass of water. We also found out that it took 37 minutes for our fruit tingle to dissolve in a glass of water.

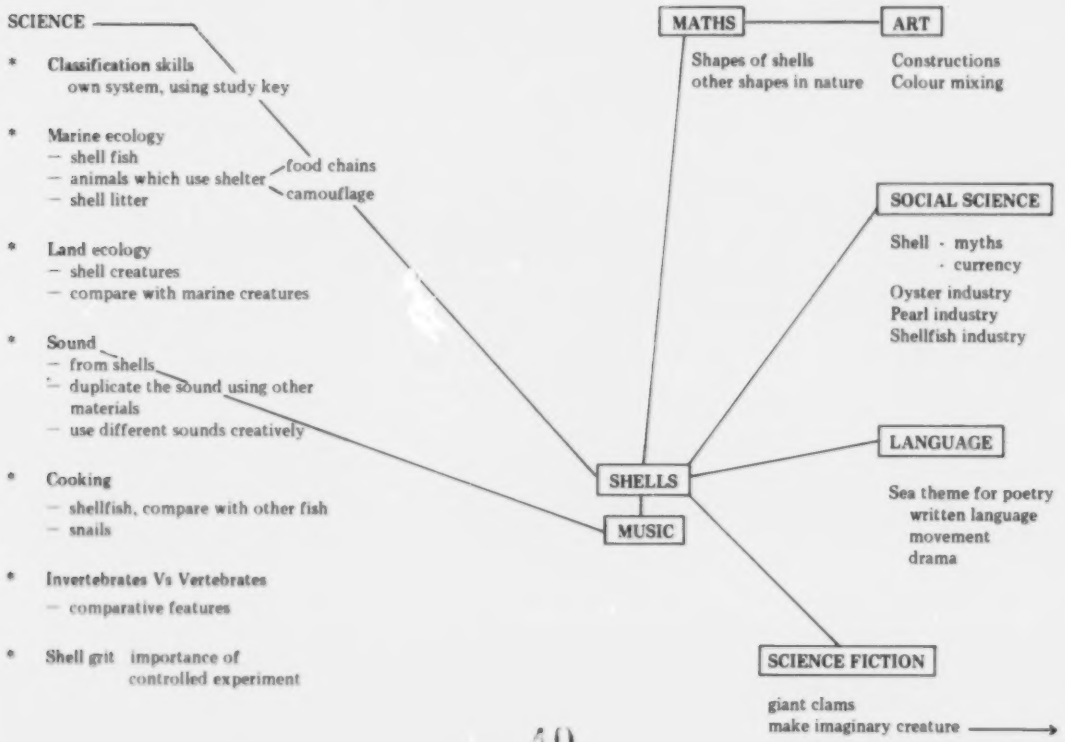
Popcorn

I cooked the popcorn to see how popcorn pops. We used tongs, aluminium foil, vegetable oil, popcorn a metal tray, a candle, clay and matches.

I got the tray and put the candle on it using the plastocene to hold it in place. Then I molded the foil into a little container and put some oil in it. Then I lit the candle. I held the foil container over the flame and put the popcorn in The oil started to bubble and the popcorn swelled up. It suddenly popped.

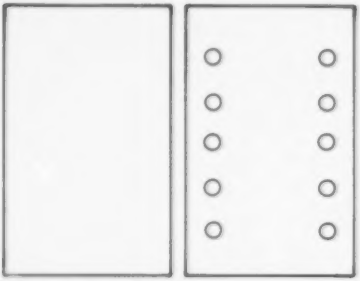
The oil heated up the popcorn and it started to swell until it popped open.

David Casson, Grade V (1980)
Waimea Heights Primary School


SCIENCE
* Classification skills
own system, using study key
* Marine ecology
– shell fish
– animals which use shelter
– shell litter
food chains
camouflage
* Land ecology
– shell creatures
– compare with marine creatures
* Sound
– from shells
– duplicate the sound using other materials
– use different sounds creatively
* Cooking
– shellfish, compare with other fish
– snails
* Invertebrates Vs Vertebrates
– comparative features
* Shell grit importance of controlled experiment
MATHS
Shapes of shells
other shapes in nature
ART
Constructions
Colour mixing
SOCIAL SCIENCE
Shell - myths
- currency
Oyster industry
Pearl industry
Shellfish industry
LANGUAGE
Sea theme for poetry
written language
movement
drama
SHELLS
MUSIC
SCIENCE FICTION
giant clams
make imaginary creature

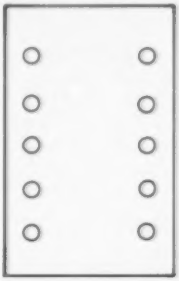
MAKING AN ELECTRIC QUIZ

Step 1.



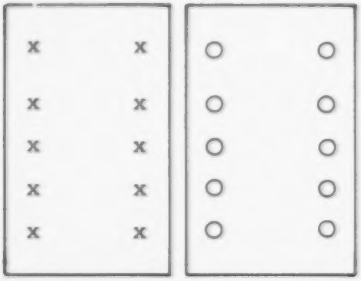
Obtain two identical pieces of cardboard, one with required number of holes punched on each side.

Step 2.



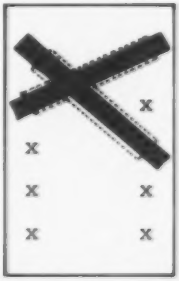
Place the punched piece on top of the other and mark in the position of the holes.

Step 3.



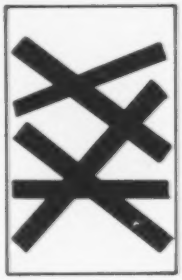
The 'x' marks on the bottom card show where the holes in the top card will lie.

Step 4.



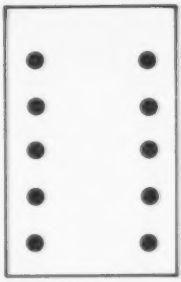
Cut strips of kitchen foil to join different 'x' marks. Use sticky tape to hold each strip down AND TO INSULATE from a crossover strip.

Step 5.



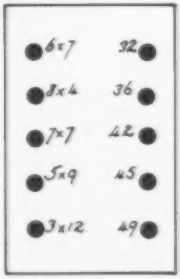
Your bottom card may now look something like this. Make certain that any two strips crossing are insulated from each other by sticky tape.

Step 6.



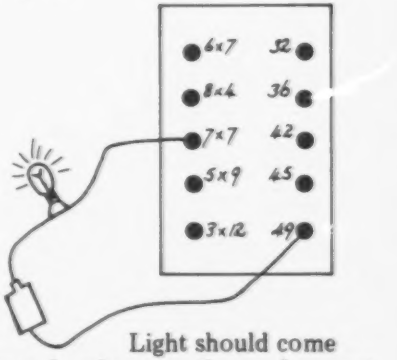
When the top card is replaced, the foil should be visible through the holes.

Step 7.



Write in your questions and answers.

Step 8.



Light should come on only when question and correct answer are connected.

This type of quiz can be used for various types of problems, e.g. countries and capital cities, football teams and star players, jumbled words and correct words.

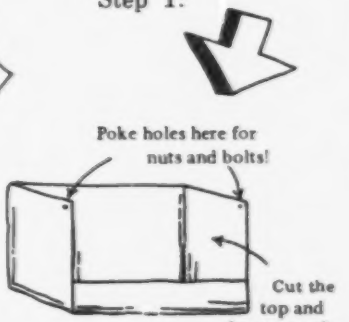
42

HOW LONG DOES IT TAKE TO COOK A WITH THE SUN?

Materials

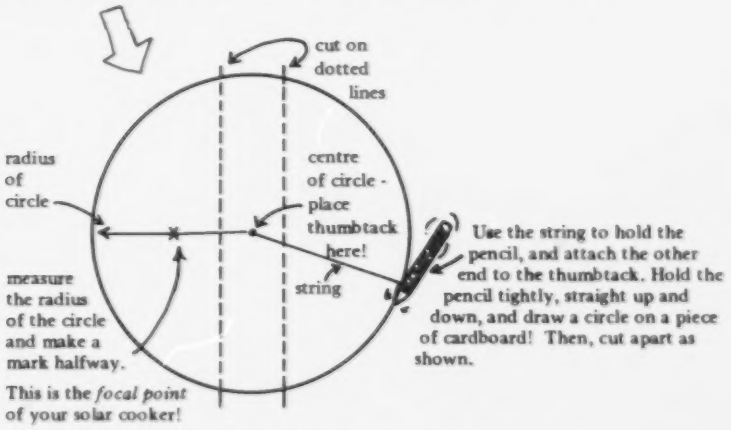
hot dog
cardboard boxes
aluminium foil
coathanger, thumbtack, string, pencil
2 small nuts and bolts
rubber cement

Step 1:



Step 2:

MAKE 2 LARGE CARDBOARD CIRCLES LIKE THIS:


cut on dotted lines
radius of circle
centre of circle - place thumbtack here!
string
measure the radius of the circle and make a mark halfway.
This is the *focal point* of your solar cooker!
Use the string to hold the pencil, and attach the other end to the thumbtack. Hold the pencil tightly, straight up and down, and draw a circle on a piece of cardboard! Then, cut apart as shown.

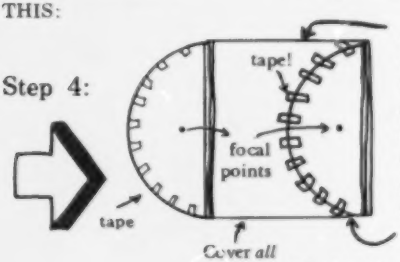
43

Step 3:
PUT THE 2 CURVED PIECES TOGETHER LIKE THIS:

Glue 2 pieces together to make 1 that's twice as heavy!

Do this with both circles you cut.

Step 4:



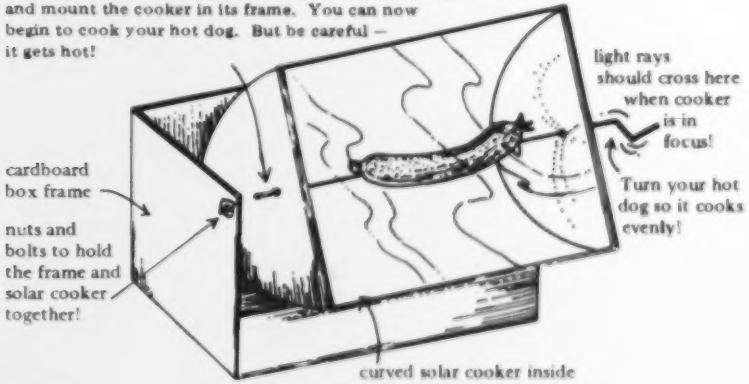
Tape another piece of cardboard to the curved edges of the 2 half circles you glued together.

The width of the piece of cardboard must be slightly less than the width of the box you cut to make a frame.

Cover the inside of this piece with aluminium foil — use rubber cement.

Step 5:

Put an unpainted coathanger through the focal points and mount the cooker in its frame. You can now begin to cook your hot dog. But be careful — it gets hot!


light rays should cross here when cooker is in focus!
cardboard box frame
nuts and bolts to hold the frame and solar cooker together!
Turn your hot dog so it cooks evenly!
curved solar cooker inside covered with aluminium foil —

Step 6:

ADJUST THE COOKER SO THAT YOU CAN SEE THE SUN'S RAYS CROSS ON THE FOCAL POINTS.
HOW LONG DOES IT TAKE TO COOK A HOT DOG?

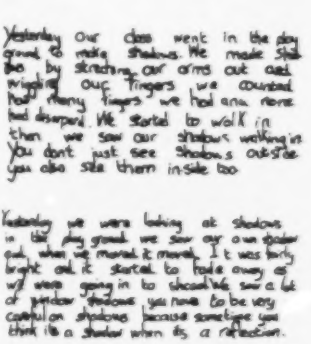
From R-7 Science Newsletter, No. 3, June 1981
Wattle Park Teachers Centre

SHADOWS

JIM – from a drawing round his shadow

SHADOWS

At Sele Bank First School in Hexham, Northumberland, Olive Ford took her class of seven and eight year old children outside.


Yesterday our class went in the play ground to make shadows. We made shadow bo by stretching our arms out and wiggling our fingers we counted how many fingers we had and more had disapeard. We started to walk in then we saw our shadows walking in You dont just see shadows outside you also see them inside too

Yesterday we were looking at shadows in the play ground we saw our own shadow and when we moved it moved. It was very bright and it started to fade away as we were going in to school We saw a lot of window shadows you have to be very careful on shadows because sometimes you think it's a shadow when its a reflection.

Leading to a shadow clock

The next day was clear and sunny. The teacher asked "If something stays still, does its shadow move?" Nobody knew. She suggested that they experimented with a jumping stand.

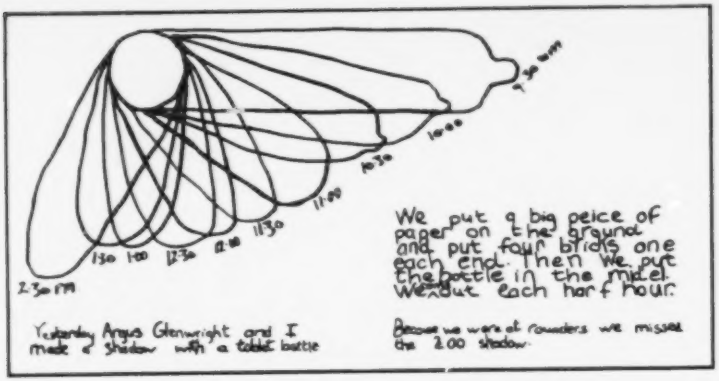
Every half hour from 9 o'clock to 3.30 the children chalked the end of the shadow on the playground. Prompted by their teacher they also measured its length, and during the day they helped her to make a histogram of the readings.

To their surprise they found that neither the length nor the position of the shadow remained the same. Nicholas wrote *"At first it was very big and it got smaller and smaller until 1.00. After 1.00 it got bigger again."*

The movement of the shadow was intriguing. *"..... every half hour the shadow was in a different place"*. The teacher wanted the children to understand why this happened. She questioned them to help them to think about it. Slowly they realised that, now they knew where the shadow would be each half hour, they could use its position to tell the time. They had made a shadow clock.

The following day the children enjoyed making their own shadow clocks. Many objects were used from toy soldiers to plastic bottles and a Wellington boot. Unexpected problems arose. Angus and Dawn put a plastic tablet bottle on a sheet of paper on which they intended to draw its shadow. It was a windy day. As they walked back to the classroom they saw their paper vanishing over the roof. On the next page is their description of what they did next, and the shadow clock they made.

Reproduced with permission from *The Association for Science Education*, Primary Science, Number 3, Autumn 1980.


2.30 PM
1.30
1.00
12.30
12.00
11.30
11.00
10.30
10.00
9.30 am
Yesterday Angus Glenwright and I made a shadow with a tablet bottle
We put a big peice of paper on the ground and put four bricks one each end. Then we put the bottle in the middel. We dut each harf hour.
Because we were at rounders we missed the 2.00 shadow.

From the height of a twin . . .

The twins decided to make a human shadow clock.

On June the twelve at nine fifteen am Kay and I started doing a human shadow clock. Kay stood very still while I drew round her shadow with a piece of chalk.

The drawing was repeated at half hourly intervals.

After they had measured the shadows Kay wrote.....

When I measured myself I found out I was one hundred and thirty two cm. The nearest shadow height to my height was the ten fifteen one.

. . . to the height of a tree

Kay's discovery that the 10.15 shadow almost matched her height had shown the teacher how to measure the big tree in the playground.

About 10 o'clock she took a group of children outside. They had two one metre sticks and a long tape. One stick was propped up vertically, and the other was used to measure its shadow as it grew shorter and shorter. At 10.30 the shadow was the same length as the stick – so the tree's shadow would be the same as its height.

The shadow was 15 metres long.

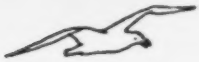
Further work

Interest in shadows had arisen spontaneously when the teacher talked with the class about different sources of light. She had been content to be sidetracked until the children had satisfied their curiosity. Then they went on to find out about the sun, moon and stars, about fire, candles, oil, gas and electric lights. They looked at different kinds of lamp, many lent by parents, and tried to find out how they worked. On the right is Jackie's drawing of a family heirloom.

This work on shadows was done in the summer. Now the teacher is wondering whether the children will notice the difference in the length of the shadows in the winter, and in the time of the shortest shadow after the clocks have been put back.

This is a sketch of the lamp that my great grandfather used in a mine in Manby in Wales. The number of the lamp is 1169. It is a bout seventy years old.

BEST COPY AVAILABLE



KEEPING ANIMALS IN THE CLASSROOM

Burwood State College (Victoria) in association with ICI Australia Limited have published a series of small handbooks entitled *Animal Studies in School.*

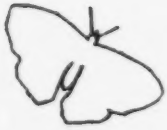
Each book is priced at only 50 cents and the set is highly recommended for all primary schools.

The series include the following titles:

1. *Keeping Animals in Schools*
2. *Yabbies*
3. *Rabbits, Guinea Pigs and Mice*
4. *Chickens, Chooks and Other Birds*
5. *Fishes*
6. *Lizards*
7. *Frogs*
8. *Sea Water Life*
9. *Tortoises*

Orders may be sent to:

Advertising Services
ICI Australia Limited
1 Nicholson Street
Melbourne, Victoria 3000

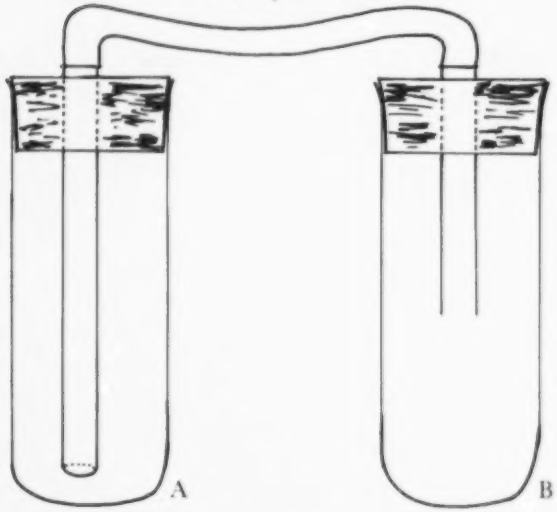


47

Chemical Force

[acknowledgement to ESSP Level E]

You will need: *two test tubes*
two bungs with single holes
two pieces of glass or stiff plastic tubing
one piece of rubber tubing
one alka seltzer tablet
cold, tepid and warm water



N.B. Borrow this gear from your local high school.

1. Almost fill test tube A with cold water.
2. Drop in ¼ Alka Seltzer tablet.
3. Replace bung very quickly.
4. Note carefully what happens between A and B.
5. What happened? Why?
6. Predict what will happen with tepid water and warm water.
7. Any differences?

Ian Pattie

Coloured Layers

Ian Winter

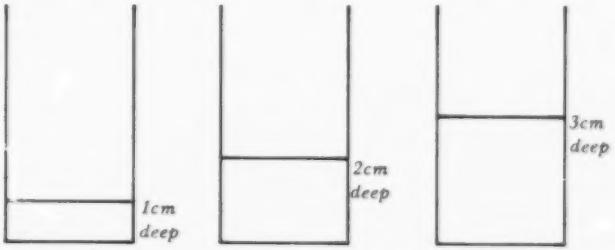
Make up the following three solutions:

- A: **50 ml of water + 1 drop of red food colouring.**
- B: **50 ml of water + 2 teaspoons sugar + 1 drop of yellow food colouring.**
- C: **50 ml of water + 4 teaspoons sugar + 1 drop of green food colouring.**

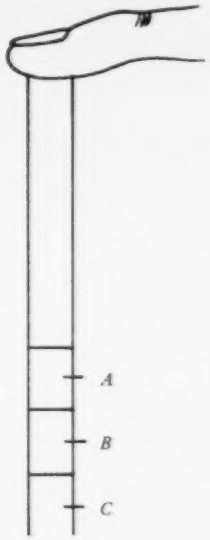
Note: Salt may be used instead of sugar.

Activity 1

Transfer the liquids into 3 tablet phials or test tubes as follows:



Now insert a clear plastic drinking straw into A, B and C successively, such that the wet end touches the bottom and a finger is placed over the dry end before withdrawal. In this way the three layers are trapped in the straw.



– finger, do not move!

Still keeping the finger secure over the dry end, what would happen if the straw is inverted?

Predict:_____

Try it:_____

Where are the liquids?_____

_____

What is the colour order?_____

_____

Activity 2

Half fill a phial with liquid B. Using the straw as a dropper, place three drops of C into the phial – watch closely and record your observations.

Add 3 drops of A – watch closely and record your observations.

Predict what would happen if you used first A, then C as the main liquid.

Note: Watch the path of the drops closely.

FINGER

LESSON ONE

AIMS. this topic gives students a variety of opportunities for observing and exploring. Of specific interest will be the use of hand lenses to examine prints and fingers.

INTRODUCTION. At the beginning of this topic it is desirable to encourage the children to experiment with different materials to find out which material is best for taking fingerprints. At first, materials should be selected and provided by the teacher, but it is to be hoped that as the activity progresses, students will develop their own ideas about suitable materials and request them from the teacher.

Students should be encouraged to ask any questions that arise from their observations. Such questioning will provide a natural lead-in to the rest of the activity.

LESSON PLAN/NOTES. Let the children experiment with the range of materials provided to make clear prints. It is very easy to take a fingerprint but more difficult to obtain a clear print. This should form the first part of the lesson.

When using the ink pad (washable ink!) roll the finger on the inked surface and then press the finger from side to side on a piece of paper, i.e. roll the finger across the paper once. Do not press too hard.

A fingerprint made on a glass slide or clear plastic can be projected onto a screen. This could be the task of one of the older groups when they have completed the main task.

No two people have been known to have identical prints. Even identical twins have different prints.

PRINTS

The children can be asked to see whether they have similar prints on the index fingers of both hands. Are all fingerprints from the same individual similar?

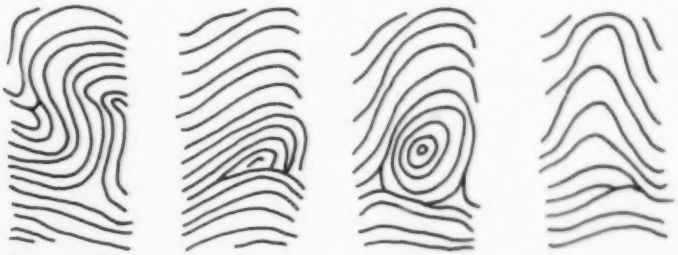
WRITTEN WORK. Ask students to complete a simple account of how to take a fingerprint and to describe what they found was the best material to use. A copy of their own print in their note book would be useful for next week's lesson.

Note: See page 54 for a continuation of this activity.

RESOURCES. Range of print materials: ink pad, water paints, sellotape, talc powder, plasticine.

To put the prints on: card, paper, glass slides, sellotape, transparency plastic.

To examine: magnifying glasses, microscopes (if available), lightscope.



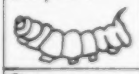
composite loop whorl arch

All or only one of these forms may occur on the fingers of both hands.

Tree SHAKE - Record Sheet

Directions: Place a small plastic bag over the end of a leafy branch and shake hard. Without opening the end of the bag, pull it off carefully without damaging the leaves. What can you see inside with your magnifying glass?

Complete the table below, and then try other trees or bushes.

	1st Shake	2nd Shake	3rd Shake	4th Shake
Aphids	Trees 1 2 3	1 2 3	1 2 3	1 2 3
Ants	1 2 3	1 2 3	1 2 3	1 2 3
Beetles	1 2 3	1 2 3	1 2 3	1 2 3
Spiders	1 2 3	1 2 3	1 2 3	1 2 3
Caterpillars 	1 2 3	1 2 3	1 2 3	1 2 3
Flies	1 2 3	1 2 3	1 2 3	1 2 3
	1 2 3	1 2 3	1 2 3	1 2 3
	1 2 3	1 2 3	1 2 3	1 2 3
	1 2 3	1 2 3	1 2 3	1 2 3

paper strength

PART I *Ian Pattie and Julia Finlay*
Glen Dhu Infant School

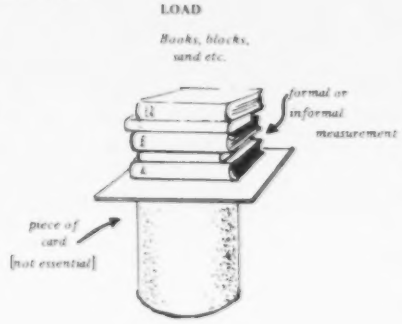
Use only a single piece of A4 paper rolled or folded so meeting edges can be taped together.

DOES SHAPE AFFECT STRENGTH?

PROBLEM: Which shape will support the greatest load?

Science skills being developed are:

- observation
- prediction
- measurement
- recording



** Prediction is most important.

* SHAPE	** PREDICTION	MEASUREMENT
A		
B		
C		
D		

* Standardise the overall size of the shapes by using a standard piece of paper.

BEST COPY AVAILABLE

MARBLE collisions ON CORRUGATED CARDBOARD

Ian Pattie

Corrugated cardboard can be used as a track to guide the path of rolling marbles.

PREDICT: **What will happen to the marbles upon collision?** **MEASURE DISTANCES**

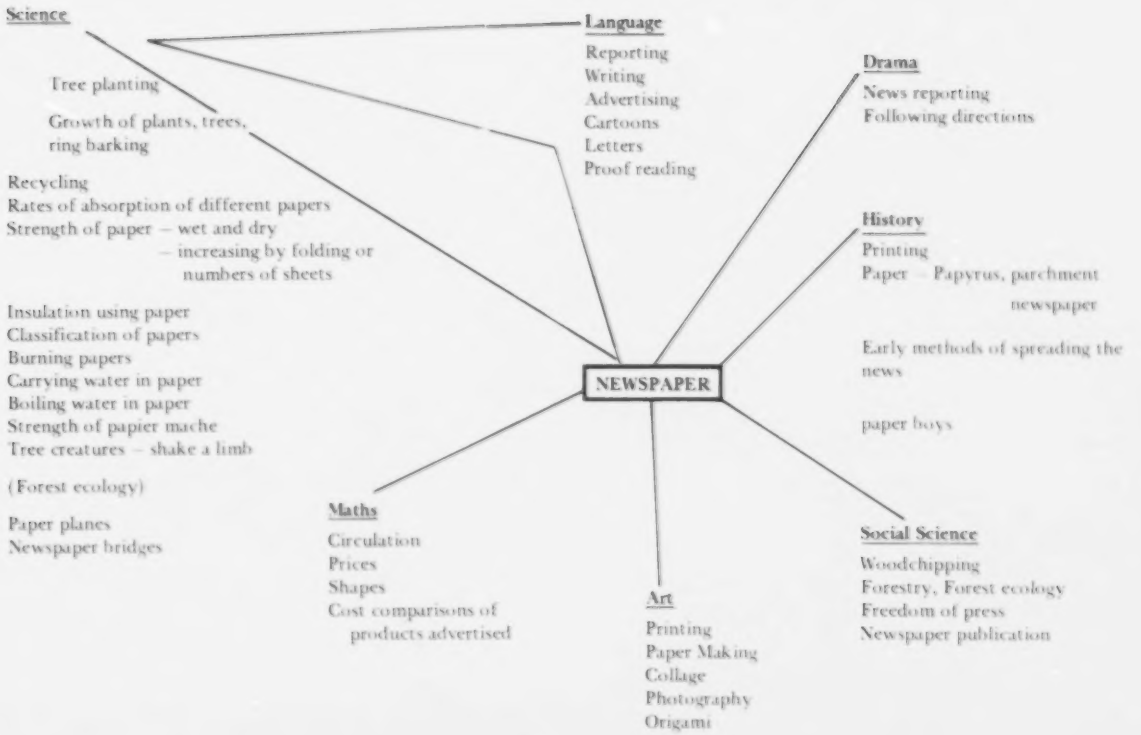
Variables.

(1) Vary the pitch of the ramp.

(2) Vary the arrangement and position of the stationary marble(s).
E.g. two or three in a row;
spaces between marbles;
snooker ball pattern.

(3) Vary the surface across which the marbles will run after leaving the cardboard e.g. carpet, vinyl tiles, flat cardboard, etc.

(4) Introduce a tom bowler.


Science
Tree planting
Growth of plants, trees, ring barking
Recycling
Rates of absorption of different papers
Strength of paper – wet and dry
– increasing by folding or numbers of sheets
Insulation using paper
Classification of papers
Burning papers
Carrying water in paper
Boiling water in paper
Strength of papier mache
Tree creatures – shake a limb
(Forest ecology)
Paper planes
Newspaper bridges
Language
Reporting
Writing
Advertising
Cartoons
Letters
Proof reading
Drama
News reporting
Following directions
History
Printing
Paper – Papyrus, parchment
newspaper
Early methods of spreading the news
paper boys
NEWSPAPER
Maths
Circulation
Prices
Shapes
Cost comparisons of products advertised
Art
Printing
Paper Making
Collage
Photography
Origami
Social Science
Woodchipping
Forestry, Forest ecology
Freedom of press
Newspaper publication

Bitter Lemon

Didn't try the rhubard champagne?
Drank all the rhubard champagne?

Here is an easier piece of KITCHEN CHEMISTRY.

Ingredients:

750 gm sugar
2 tablespoons (40 mls) of cider vinegar or white vinegar
4 average lemons
4½ litres of cold water

Instructions:

Pour water into bucket.
Thinly peel skin from fruit – avoid pith – put peel in bucket.
Squeeze juice from lemons into bucket.
Add sugar and vinegar.

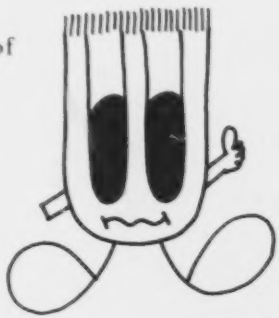
Stir until sugar dissolved.

Cover, leave standing but stir three times a day until fermentation occurs (soft bubbles and peel rising).

Bottle. Leave fortnight before drinking.

Experiment with variations of the recipe.

Send students' records (with several litres of samples) to the editor.



LITMUS? DON'T NEED IT!

Ian Winter

Classifying chemicals including kitchen chemicals such as vinegar, bi-carbonate of soda, soap, detergent, juices, salt, sugars can involve the use of an indicator to test for acidity or alkalinity. You can make your own indicator using the natural dyes from many plants. One of the best is the juice from **red cabbage** – a heavy purple variation of our normal green cabbage. When cooked with water, the water becomes purple (the higher the ratio of cabbage:water, the more intense the colour).

This purple liquid can then be tested for colour change. For full effect I usually add **vinegar** to one juice sample and **cloudy ammonia** to a second sample. Armed with knowledge of the range of colour changes you can then group all your chemicals into

1. purple – red
2. purple – green

or 3. no colour change

Some of the questions:

1. What would happen if you added first vinegar then cloudy ammonia to the purple juice?
2. What common characteristics do all the group one chemicals have?
3. Can we extract other dyes which will change colour?
   [Try geranium petals, red rose petals.]

YOGHURT

[SIMPLE AND INEXPENSIVE]

Ailsa Steiner
George Town Primary School

You will need: a saucepan; a crockpot; one litre of UHT milk; and one small carton of natural yoghurt (Yomix culture A & B) as fresh as possible.

Do this carefully:

* Heat milk in saucepan until blood temperature. [How will you measure this?]
* Put 2 x 5ml measures of yoghurt into crockpot.
* Add milk to crockpot. Stir – not vigorously – but mix yoghurt and milk very well.
* Turn crockpot on low for one (1) hour. Do not put lid on crockpot. Cover pot with a teatowel.
* Turn off and leave till cool. Put in refrigerator until set.

Are you a sweet tooth? When serving, add jam, milo or sugar to the yoghurt.

What would happen if you altered:

(i) the amount of UHT milk?
(ii) the amount of starter yoghurt?
(iii) the length of cooking time?

What Would Happen If?

Ian Winter

Using a strong magnet, a gap 10 - 20 mm can be obtained.

Children can be encouraged to ask questions such as:

> *What would happen if* the magnet was turned around?
>
> *What would happen if* a piece of paper (glass, plastic, various metals) was placed in the gap?
>
> *What would happen if* the string was cut?
>
> *What would happen if* another magnet was brought near the paper clip?

Having stated their questions, children should be encouraged to **predict** what might happen before setting up the system and testing out their prediction.

What can this demonstration tell you about magnets? About magnetic forces? About forces?

A challenge! Who can find the most questions?

FINGER

LESSON TWO

AIMS. Observations and ordering data. Hand lenses can again be used to examine details of the prints.

INTRODUCTION. For the younger children this can take the form of a detective game of discovering the identity of an unknown print maker, but for the older children this approach can be developed into a classification of print types and a mathematical representation of data.

LESSON PLAN/NOTES. Divide the class into groups of six or seven pupils. These groups may be of mixed or of similar age ranges. Give two cards to each child and ask them to make a print of their index finger on each. On one card let the child write his/her name below the fingerprint and on the other write the name on the back of the card. The teacher shall place the second cards from each group into an envelope. Each group then receives one of the colleague's prints from the envelope, with the name covered by sticky tape. The task of the group is to find out to whom the fingerprint belongs. This detective activity can be repeated using other cards from the envelopes.

At this point the teacher can focus his students' attention on the interesting question — how do the police find the time to look through the thousands of fingerprint records they have on file? The F.B.I. is said to have 150 million prints.

PRINTS

Can the prints be grouped to make searching and checking easier?
Are there different types of prints?
There are in fact four main types of print.

This line of questioning can lead into an open session where the pupils, especially the older ones, may discover some or all of the types. This can be done either as a class or in small group discussion(s).

The other print taken by the children at the beginning of the lesson can be used to make up a class wall-chart to find out how many of each print type can be found in the class. The impressions taken by Scotland Yard show 60% loops, 18% whorls, 17% composites and 5% arches.

WRITTEN WORK. The handout on types of fingerprints can be pasted into note books. Younger children can record their types of print and count the numbers of each type in the class. Older children can make a histogram of class types. They can compare the class results with the figures for Scotland Yard.

FOLLOW-UP WORK. Making models of prints.

RESOURCES. Ink pads, card, sugar paper, envelopes, magnifying glasses, sticky tape, scissors.

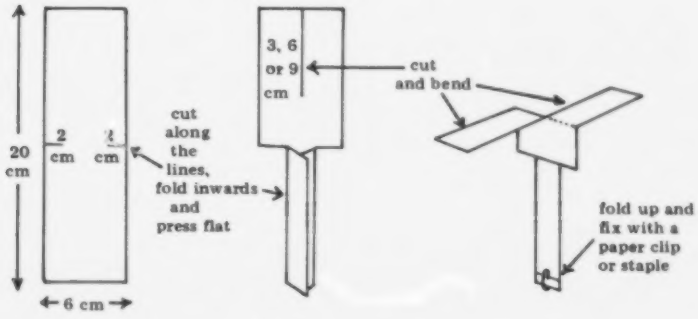
FROM SYCAMORE SPINNERS TO PAPER SPINNERS

Reproduced with permission from *The Association for Science Education*, Primary Science, Number 7, Spring 1982,

Vivien Smith, the teacher with responsibility for science at Castlechurch First School, Stafford, runs a weekly after-school nature club meeting for a group of 8 year olds.

Last autumn, besides the usual pairs of sycamore keys, they found single ones, and groups of 3 and 4. When the children dropped them from a height of 2 metres they found that those with single wings spun faster and flew further than the others, and the bigger the wing the further the key went. Rachel's, which had the largest wing, flew over 4 metres, and Julian's, the smallest, flew only 80 centimetres.

The children went on to make paper spinners, using this design.


20 cm
2 cm
2 cm
cut along the lines, fold inwards and press flat
6 cm
3, 6 or 9 cm
cut and bend
fold up and fix with a paper clip or staple

Paper spinners are easily made and raise many other interesting questions.

How does the time they take to fall depend on the height they start from?

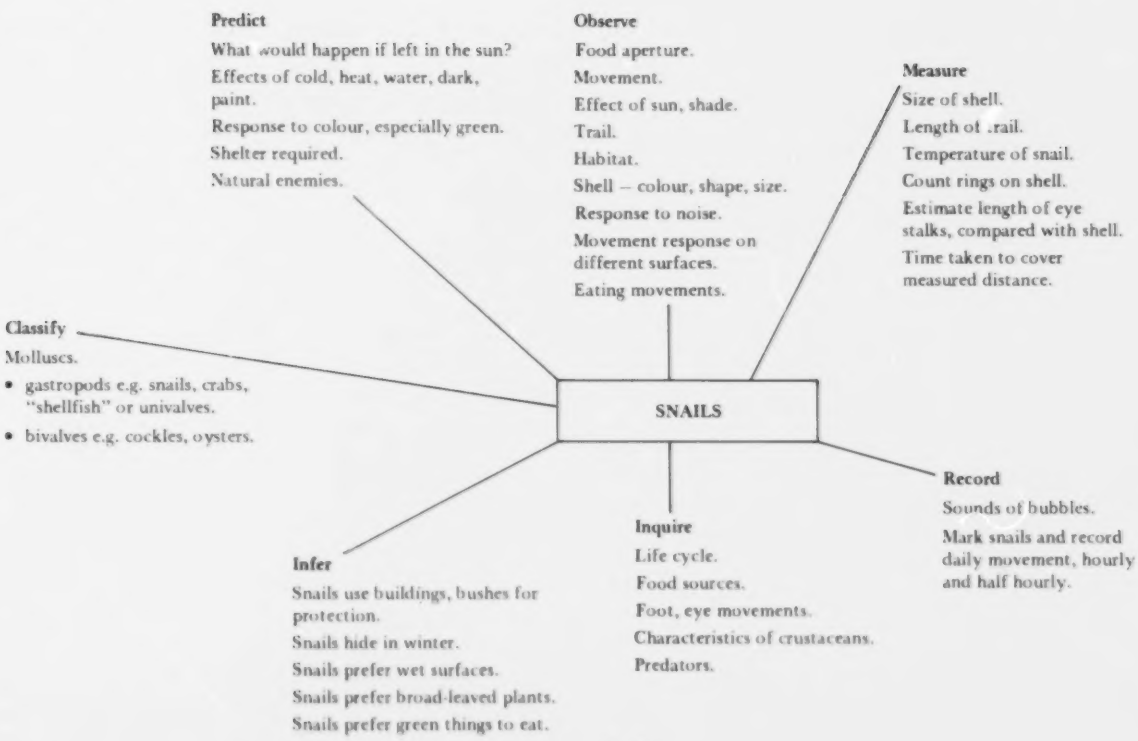
Does it depend on how heavy they are? Add more paper clips or use heavier paper.

What happens if a wing is broken or torn?

Does a single-winged spinner work well? The single sycamore keys were the best spinners.

What decides which way they spin?

Who can make the biggest working spinner? Who the smallest one?


Predict
What would happen if left in the sun?
Effects of cold, heat, water, dark, paint.
Response to colour, especially green.
Shelter required.
Natural enemies.
Observe
Food aperture.
Movement.
Effect of sun, shade.
Trail.
Habitat.
Shell – colour, shape, size.
Response to noise.
Movement response on different surfaces.
Eating movements.
Measure
Size of shell.
Length of trail.
Temperature of snail.
Count rings on shell.
Estimate length of eye stalks, compared with shell.
Time taken to cover measured distance.
Classify
Molluscs.
• gastropods e.g. snails, crabs, "shellfish" or univalves.
• bivalves e.g. cockles, oysters.
SNAILS
Infer
Snails use buildings, bushes for protection.
Snails hide in winter.
Snails prefer wet surfaces.
Snails prefer broad-leaved plants.
Snails prefer green things to eat.
Inquire
Life cycle.
Food sources.
Foot, eye movements.
Characteristics of crustaceans.
Predators.
Record
Sounds of bubbles.
Mark snails and record daily movement, hourly and half hourly.

More Marbles

(a)

corrugated cardboard

(b)

corrugated cardboard

(c)

Consider these variables for a, b or c:

pitch of ramp(s);
mass of the marble;
size of the marble;
surface over which marbles may run, for example, corrugated cardboard, lino tiles, carpet.

Ian Pattie

PROBLEM

How far will the marble roll?

Prediction **Measurement**
(formal or informal units)

How far will the marble fly?

Prediction **Measurement**
(formal or informal units)

How far will the marble return?

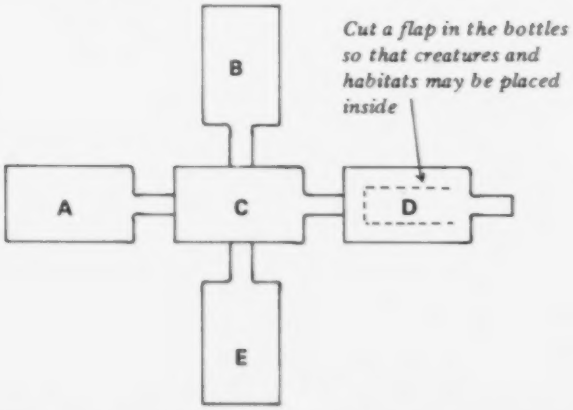
Prediction **Measurement**
(formal or informal units)

Invertebrate Vivarium

from participants in
Leadership in Primary Science
Launceston

Use those 2 litre plastic bottles.

N.B. This arrangement is not static.



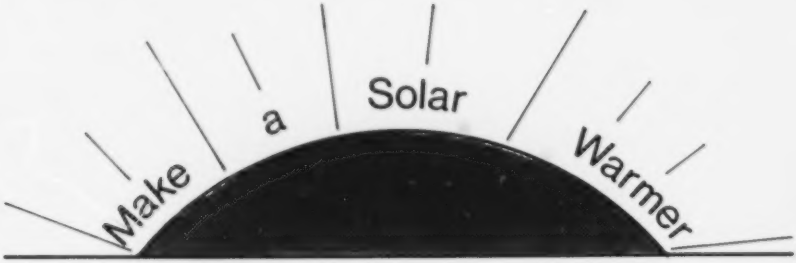
Problem: Which environment does the invertebrate prefer?

Bottle A: Home environment
Bottle B: Extra moist
Bottle C: Vacant
Bottle D: Rocky
Bottle E: Water/food.

Using this satellite arrangement it would be possible to discover how invertebrates reacted to:

(i) light and dark or stages between;
(ii) different types of food;
(iii) predators or companions;
(iv) changes in temperature.

67



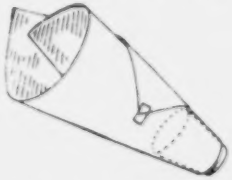
Here is a way to use the sun to warm food.

1. Cut a piece of aluminium foil and a piece of heavy paper. Make them both 46 centimetres long and 30 centimetres wide. Handle the foil gently so there will not be too many wrinkles.

2. Use rubber cement and glue the foil to the paper with the shiny side up.

3. Cover the inside of a paper cup with black paper. Place a slice of apple in it. Put the cup inside a plastic bag and tie the top.

4. Roll the foil around the cup and tape the end. Be sure the foil is on the inside and the paper is on the outside. It will be shaped like a cone.



5. Take it outside on a sunny day. Aim it at the sun. Hold it so the brightest light reflects into the cup. The cup will soon begin to feel warm. After a while, remove the fruit and take a bite.

Junket Chemistry

AN EXERCISE IN TIMING

What affects junket's setting ability?

There are three *variables* involved:

the number of tablets;
the volume of milk; and
the temperature.

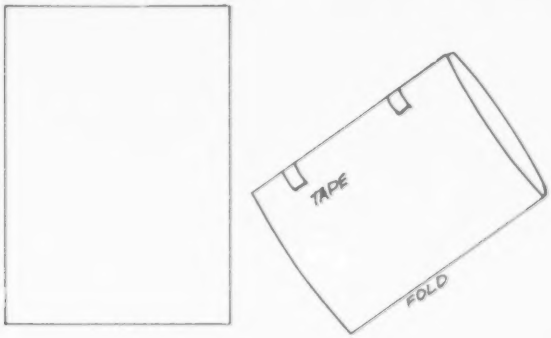
In the example given below, one variable (temperature) is systematically altered and the results recorded.

TABLETS	MILK VOLUME	TEMPERATURE	SETTING TIME
1	½ litre	very cold (fridge)	
1	½ litre	cold	
1	½ litre	cool	
1	½ litre	warm	
1	½ litre	hot	

From Pam Harrison
Summerdale Primary School

PAPER STRENGTH

This is a simple activity which nevertheless allows students to practise important science skills. All that is required is a single piece of A4 paper rolled or folded so that the meeting edges can be taped together.



TESTING PAPER STRENGTH

Does height affect strength?

Problem: Which height will support the greatest load?

Science skills being developed are:

prediction;
measurement;
recording.

PREDICTION IS MOST IMPORTANT

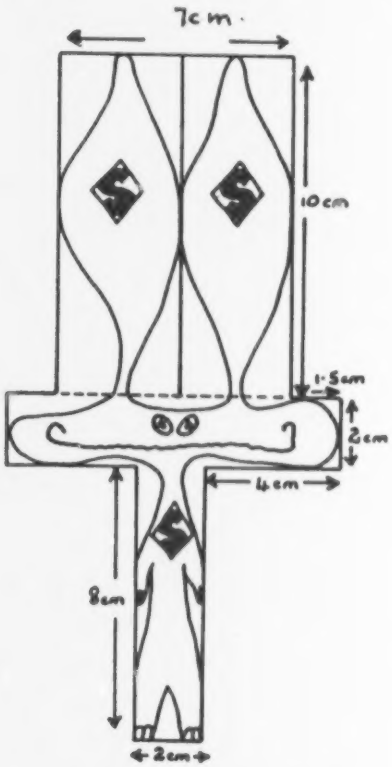
The last edition examined the effect of shape on strength.

HEIGHT	**PREDICTION	MEASUREMENT
1 unit		
2 units		
3 units		
4 units		

71

Manipulate those paper spinners

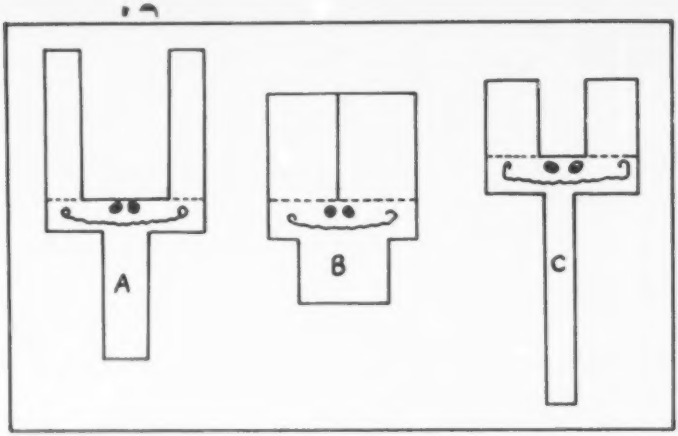
Continuation from Edition No 6, 1982



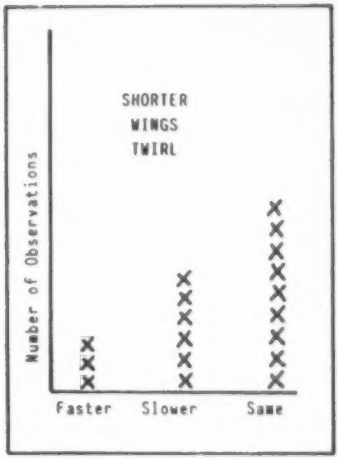
Standard model BUGSCOPTER

Drawings from *Science and Children* Nov/Dec 1982

72



Variables for buscopters. N.B. Paper clips make ideal weights.



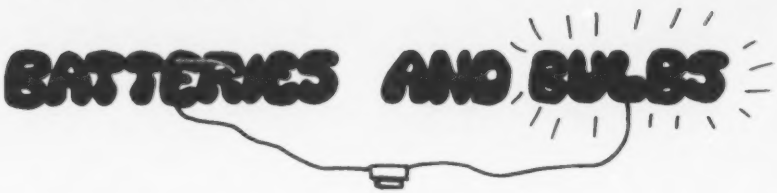
A recording technique.

SKILLS BEING DEVELOPED

- controlling variables
- recording

73

BATTERIES AND BULBS



by Pauline King

Recently, I had the enlightening experience of working with a class of Grade I pupils at a nearby primary school. I had been asked to give some assistance in teaching electricity to the group of six-year-olds.

Where to start? Do six-year-olds want to learn about electricity? Isn't it a bit beyond them?

Well, to answer the last question first. No, it's definitely not beyond them. Yes, they are extremely curious and interested in electricity and, in this day and age of mass media and extensive use of technology, children coming to school generally know and bring considerable experience of the outside world to the classroom.

Where to begin?

To begin with the use of the pupils' senses seemed as good a starting point as any. So loaded up with batteries, battery holders, bulbs, bulb-holders and plastic coated electrical wire we set out to explore, investigate and discover.

Prior to the introductory lesson, in my planning I'd outlined a flow chart based on the fundamental skills that I hoped could be developed. (See chart at end.)

As the first and subsequent lessons developed, it became obvious that these skills and many other desirable objectives were being achieved successfully and enthusiastically.

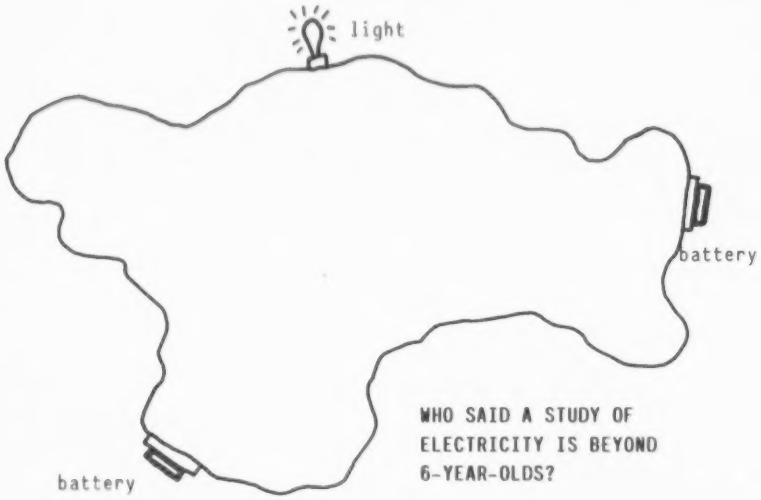
At the beginning of the lesson we discussed the concrete materials — bulbs, batteries, etc. as we explored them through our senses. We talked about other objects that had batteries, for example, transistor radios, torches, calculators and toys. We planned to collect such items from home and show our classmates.

Pupils were asked to use the equipment to make the bulb in each group's collection of equipment light up. Without further ado they set to. In a few minutes I heard among the bevy of enthusiastic voices one say, 'My bulb is brighter now. I've put in another battery'.

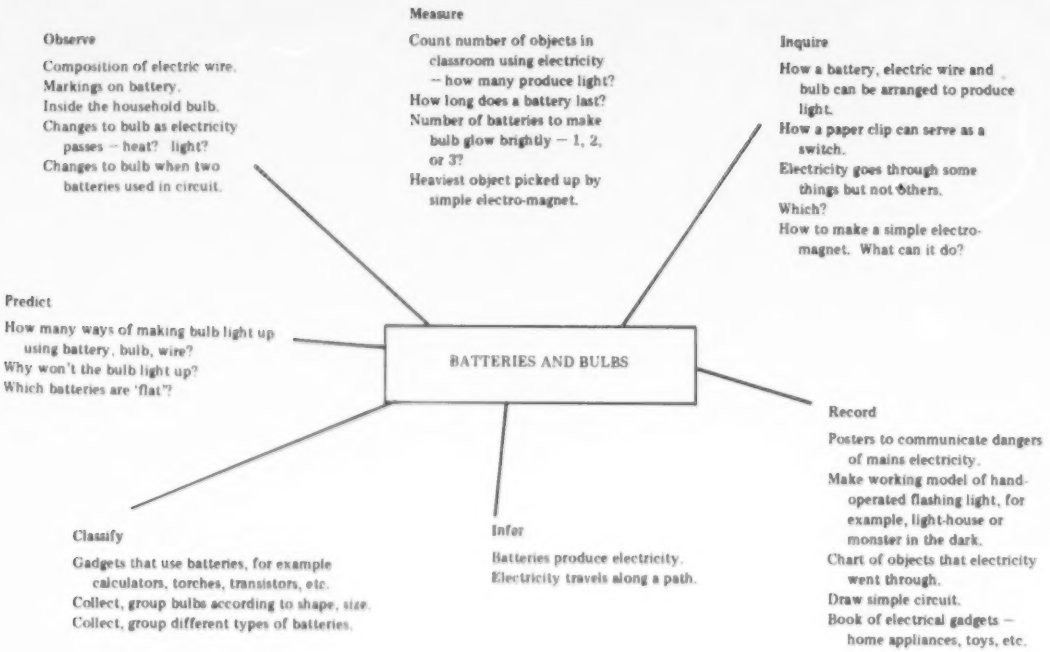
Other groups, not to be outdone, copied the idea and they too had brightly glowing bulbs in a short while.

Towards the end of the lesson time, I gathered the pupils together to discuss the power of our batteries compared with that of mains electricity at home, outlining the extreme danger involved in experimenting with that. This, of course, prompted the swapping of stories of tragedy related to instances of electrocution. We discussed also the conveniences and gadgets at home that run on electricity. In the remaining minutes, pupils sketched pictures of household appliances that run on electricity. One child, a slower learner, I was told afterwards, came to me and explained almost apologetically that he hadn't started his pictures of T.V. or washing machine yet because he'd drawn first a picture of 'What I've just been doing'.

On looking at his sketch, I found that he'd drawn the circuit that he and his partner had completed. It looked very similar to the diagram below.



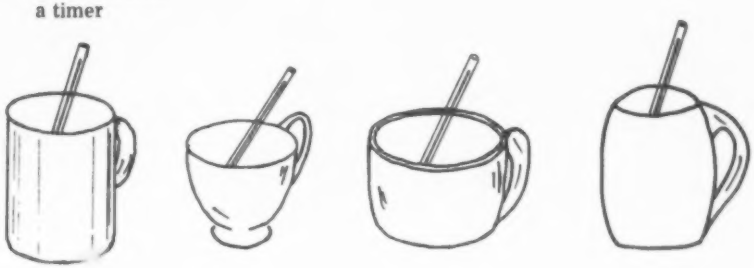
WHO SAID A STUDY OF ELECTRICITY IS BEYOND 6-YEAR-OLDS?


Observe
Composition of electric wire.
Markings on battery.
Inside the household bulb.
Changes to bulb as electricity passes – heat? light?
Changes to bulb when two batteries used in circuit.
Measure
Count number of objects in classroom using electricity – how many produce light?
How long does a battery last?
Number of batteries to make bulb glow brightly – 1, 2, or 3?
Heaviest object picked up by simple electro-magnet.
Inquire
How a battery, electric wire and bulb can be arranged to produce light.
How a paper clip can serve as a switch.
Electricity goes through some things but not others.
Which?
How to make a simple electro-magnet. What can it do?
Predict
How many ways of making bulb light up using battery, bulb, wire?
Why won't the bulb light up?
Which batteries are 'flat'?
BATTERIES AND BULBS
Record
Posters to communicate dangers of mains electricity.
Make working model of hand-operated flashing light, for example, light-house or monster in the dark.
Chart of objects that electricity went through.
Draw simple circuit.
Book of electrical gadgets – home appliances, toys, etc.
Classify
Gadgets that use batteries, for example calculators, torches, transistors, etc.
Collect, group bulbs according to shape, size.
Collect, group different types of batteries.
Infer
Batteries produce electricity.
Electricity travels along a path.

Here is an activity to find out which cup keeps the water hottest for the longest period of time.

Materials required:

cups or mugs of various shapes
hot water
thermometers
a timer



Other variables may be considered:

thickness of cups
height of cups
capacity of cups

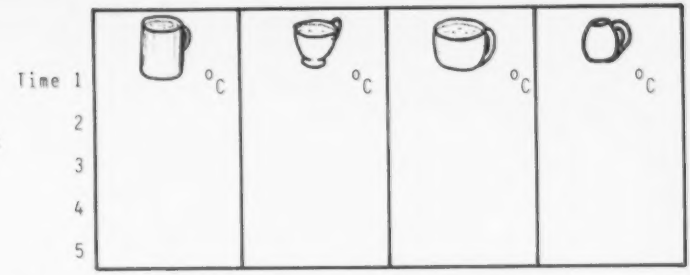
The results of the activity could be recorded in these ways:

On cards

Cup 1	
After	
1 min	°C
2 mins	°C
3 mins	°C

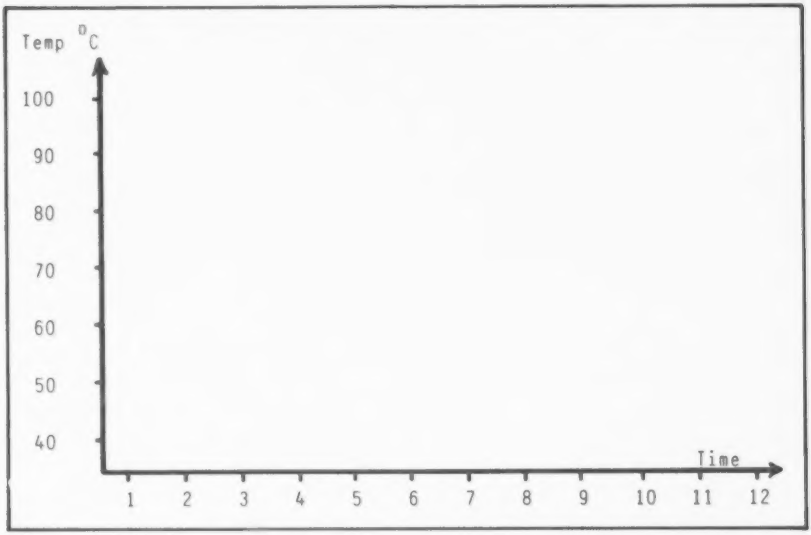
COFFEE

On a chart



This method is possibly best for infants, as time intervals need not be reliant on a clock.

By graph



By Pam Harrison, Summerdale Primary School

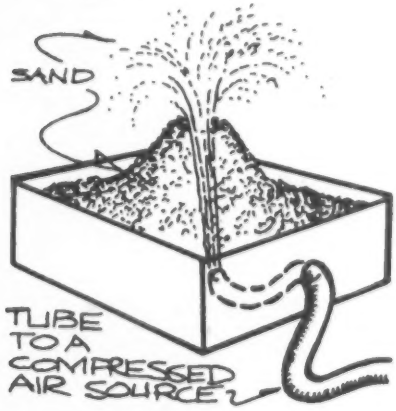
A Safe Volcano Model

Maurice Schwartz,
Science and Children,
February, 1981

The explosive character of potassium permanganate and the carcinogenic potential of ammonium dichromate make volcano models that use these materials extremely dangerous. However, many textbooks describe them, and many teachers use them.

For a truly safe model volcano, you need only a box, sand, tubing, and compressed air. The box should be about 30 x 30 centimetres (cm) and at least 18 cm deep. Before filling the box with sand, fasten one end of some laboratory tubing in an upright position on the bottom-centre of the box. Any lab hardware that will hold the tubing in this position will be satisfactory. Attach the other end of the tubing to a compressed air source, either an outlet in your class laboratory or a tank. Fill the box with sand until the end of the tube is covered with about 10cm of sand.

Very gently, open the compressed air valve so the air will begin to blow individual grains of sand a few centimetres above the surface. The grains will fall back and develop a circular cone-shaped mound with a round crater in the centre where the air is shooting up. The cone will grow to its maximum possible size, depending on your equipment, or until you turn off the compressed air supply.



With practice you can effectively operate the model every time. To repeat the demonstration, just smooth out the sand surface and start over again. Practice controlling the release of compressed air several times before showing the class the volcano. Do not open the compressed air valve too wide and too fast, or sand will blow on everyone who is standing around the volcano.

Although compressed air will not be available in most schools, a car tyre pump is an easily obtained source of compressed air. Scuba divers may like to try compressed air from their diving tanks.

What you develop with this model is a cinder cone, one of three types of volcanic cones. Paricutin, in Mexico, is an example of a large and relatively newly-developed cinder cone. In cinder cones, the rock fragments and ash that are ejected fall back to Earth, building up the circular cone with a crater above the central vent.

If your students want to continue their investigation of cinder cones, have them measure the angle of slope of the sides of several of the cones. Is it always about the same angle of slope or does it vary widely? Usually the angle is about a 35 slope, the angle of repose of dry, loosely accumulated material on land. All in all, the model described here is graphic, technically correct, and perfectly safe. Try it for fun and learning in your classroom.

Science fun with cents

A. CLEAN A COIN

1. Place 1 centimetre of vinegar in a cup.
2. Add $\frac{1}{2}$ teaspoonful of salt.
3. Stir the vinegar and salt for 1 minute.
4. Place a dirty coin in the cup. Stir for about fifteen seconds.
5. Remove the coin. Is it shiny?

B. MAKE A COIN APPEAR

1. Have a student sit next to a table.
2. Place a coin in a bowl or cup you can't see through. It should be just out of view. Tell your friend to hold still.

3. Without making the coin move, slowly fill the cup with water.
4. Your friend should now see the coin.

C. COIN PUZZLE

1. Place three coins like this:

2. Move coin 3 in between coins 1 and 2. Do it without moving coin 2 and do not touch coin 1.

D. ANOTHER COIN PUZZLE

1. Place ten coins like this:

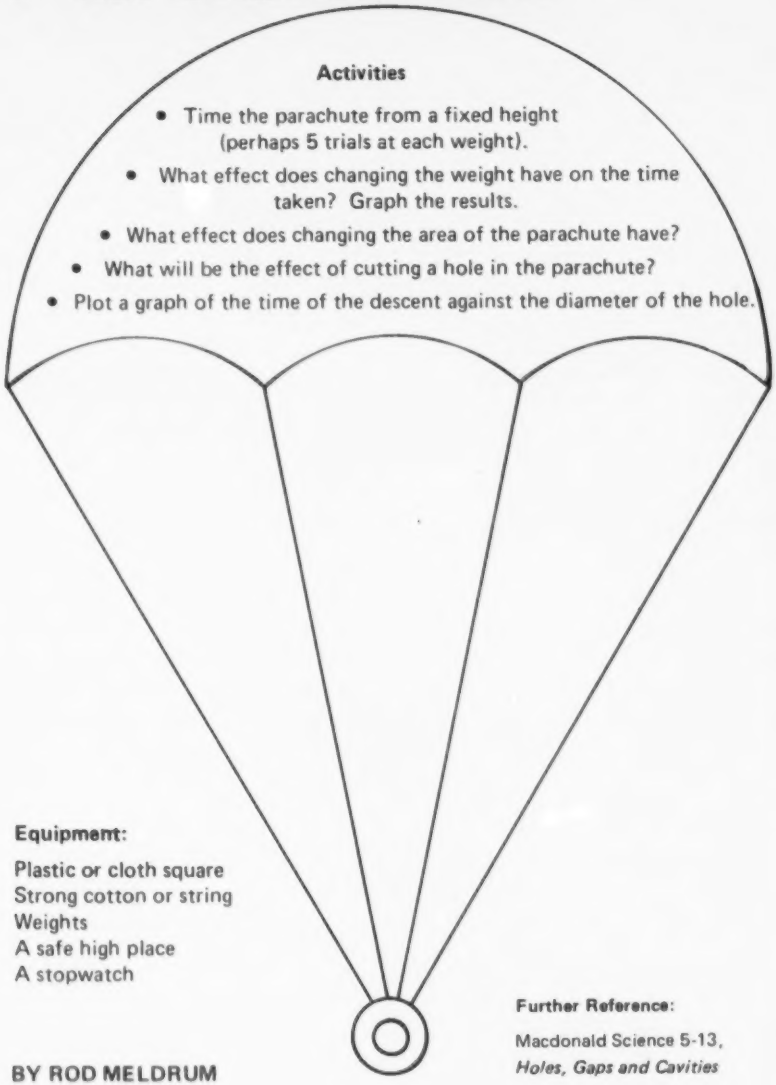
2. Move only three coins. Make them look like this:

What would happen if *Number 8*

Parachutes

Activities

- Time the parachute from a fixed height (perhaps 5 trials at each weight).
- What effect does changing the weight have on the time taken? Graph the results.
- What effect does changing the area of the parachute have?
- What will be the effect of cutting a hole in the parachute?
- Plot a graph of the time of the descent against the diameter of the hole.



Equipment:

Plastic or cloth square
Strong cotton or string
Weights
A safe high place
A stopwatch

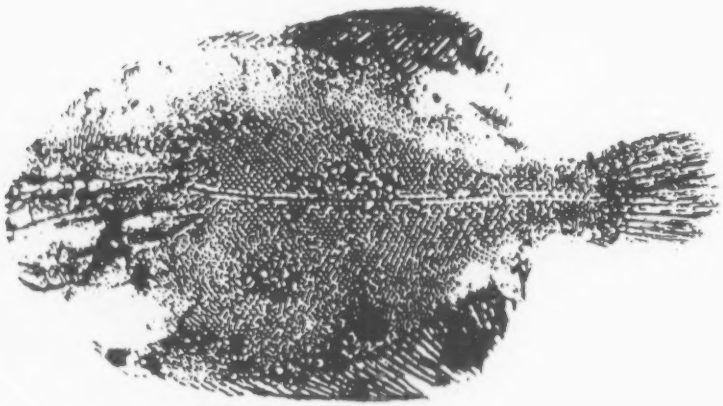
Further Reference:

Macdonald Science 5-13,
Holes, Gaps and Cavities

BY ROD MELDRUM

Gyotako or . . .

BY PAM HARRISON



Science and Children
November/December, 1982

Gyotako was developed by Japanese fishermen but can now be used to discover shape, and textures of fish in detail. Encourage experimentation with different kinds of paper and various colours of ink.

Equipment:
- rubber rollers (soft ones are best);
- absorbent paper (newspapers);
- water-based block printing ink in various colours;
- a non-absorbent surface for rolling out the ink;
- cardboard on which to put the fish;
- frozen fish (to prevent splitting).

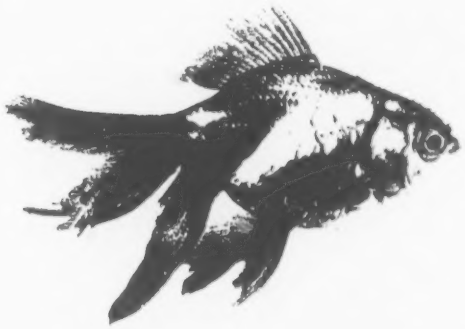
Fish Printing

Procedure:

Step 1 Put the fish on a sheet of cardboard.
Roll the ink out thinly on the non-absorbent surface.

Step 2 Ink the fish gently with the roller.

Step 3 Put the paper on top of the fish and rub it, being careful not to smear the ink.



N.B. To check whether the transfer of ink to paper has taken place, hold the paper firmly to the tail section and lift the paper from the head. If the print is not sufficiently inked, the children can put the paper back down.

Fins can be held in place with balls of clay whilst inking.

This activity is a simple but effective way of developing student skills in predicting, measuring and recording.
In a previous issue students were asked to find out how a piece of paper's strength is affected by its height.
In this issue, students are asked to determine the affect of the thickness of the paper.

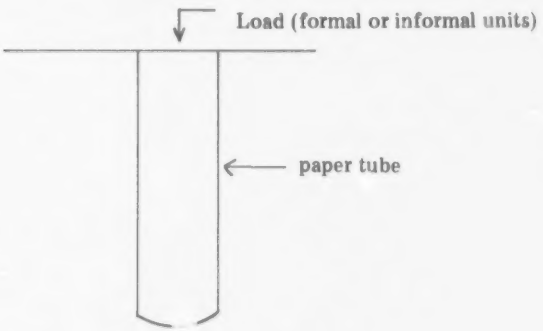
What would happen if *Number 8*

PAPER STRENGTH

DOES THICKNESS AFFECT STRENGTH?

Use sheets of A4 paper to make a number of paper tubes of varying thicknesses. The pieces of paper should be glued and rolled into a tube of the required diameter.

Problem: Will the thickness of a tube affect its strength?



The science skills that are developed in this activity include:

prediction
measurement
recording

** PREDICTION IS MOST IMPORTANT

Students can use the following table to record their experiment:

THICKNESS OF TUBES	** PREDICTION	MEASUREMENT
1.		
2.		
3.		
4.		

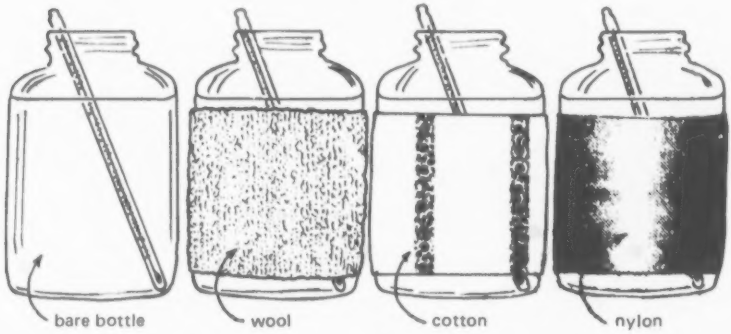
BY IAN PATTIE

INSULATION

BY PAM HARRISON
SUMMERDALE PRIMARY SCHOOL

Which fabric is best at holding in heat?

You will need: hot water; and
plastic bottles, same size and shape.



Decide how to record observations. One way is shown below.

TIME	TEMPERATURE (°C)			
	Bare bottle	Wool	Cotton	Nylon
5 min				
10 min				
15 min				
20 min				

Discuss the ways in which people use the insulating qualities of different fabrics: in the types of clothing they wear; in their homes; and in the insulation of food.

87

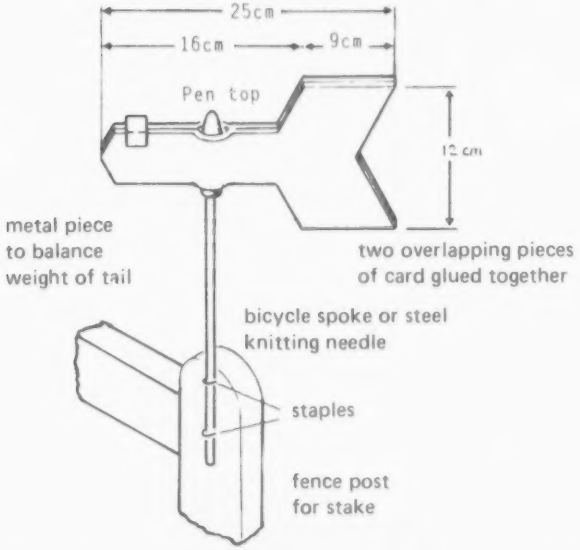
Wind Measurement Models

Further information and ideas:

a) Environment Discovery Series: *Wind*

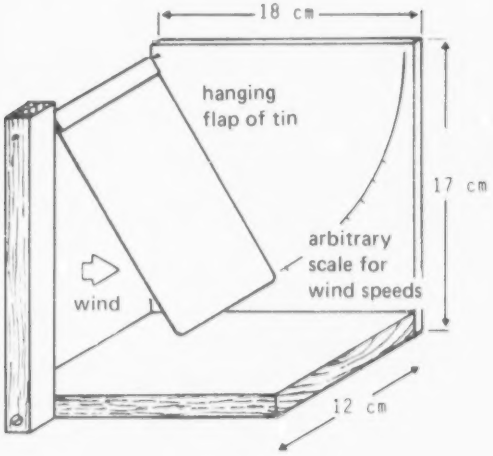
b) Macdonald Science 5-13: *Tackling Problems Part 2, Investigations Part 2, Changes Stages 1 and 2, Science From Toys Stages 1 and 2.*

Make the tailpiece larger than the pointing end, but balance it with the metal weight.

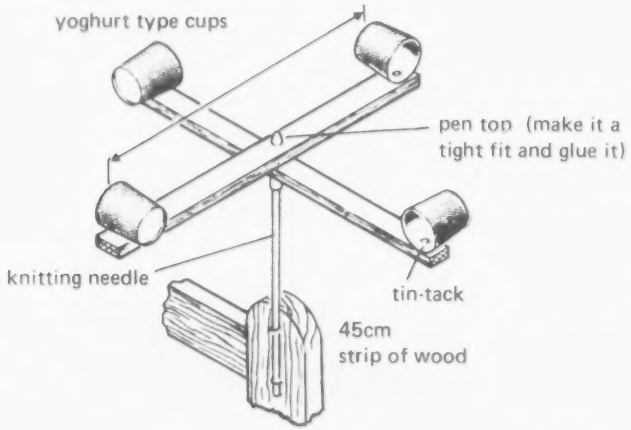


88

A SIMPLE WIND-SPEED INDICATOR (1)



INDICATOR FOR WIND SPEED (2)



From: *Learning Through Science,*
Science Resources for Primary and Middle Schools,
Macdonald, 1982.

Making a Solar Water Heater

FROM EXPLORING YOUR WORLD 'CURIOSITY SHOW'

A solar water heater captures heat from sunlight and stores it in water. Heat is absorbed by dark, dull surfaces and reflected from light, shiny ones. A solar water heater uses all of these effects.

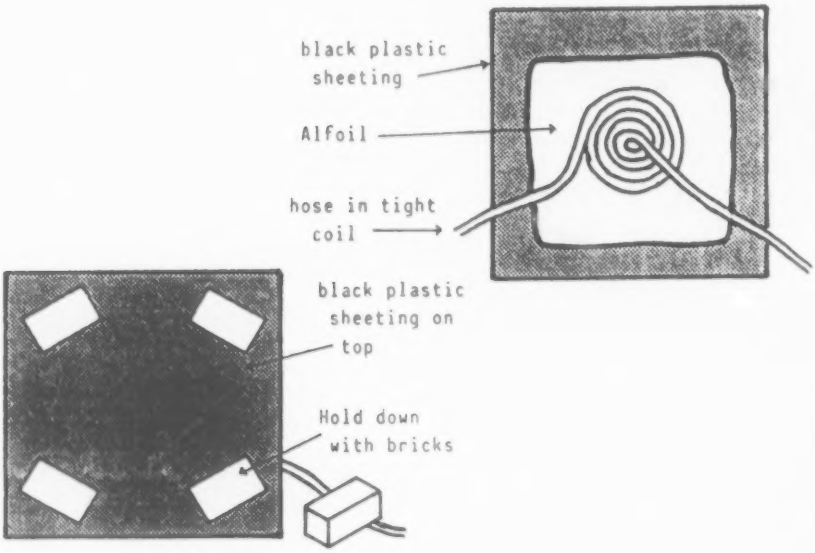
YOU WILL NEED:

black plastic sheeting (2 squares, each 1m x 1m or one piece 2m x 1m folded in the middle);
aluminium foil;
wire;
garden hose;
bricks or stones;
a sunny day.

WHAT TO DO:

1. Spread some plastic sheeting on the ground in a sunny place. Use small wire loops to pin it down.
2. Lay strips of aluminium foil over the plastic to cover it. Use wire loops on this too.
3. Make the hose into a tight, flat coil that touches itself all the way around. One end should be attached to a tap, the other should just poke over the plastic edge. The coil must all lie on the foil.
4. Cover the coil with another sheet of plastic so that it touches the hose all over. Stretch it tightly over the coil and weigh down the edges with bricks or stones, to keep out cold air.
5. Turn on the tap, so that the water is running gently.

The black plastic must be clean. It absorbs heat which warms the water in the hose. Heat that escapes downwards is reflected back by the shiny foil.



MORE TO DO:

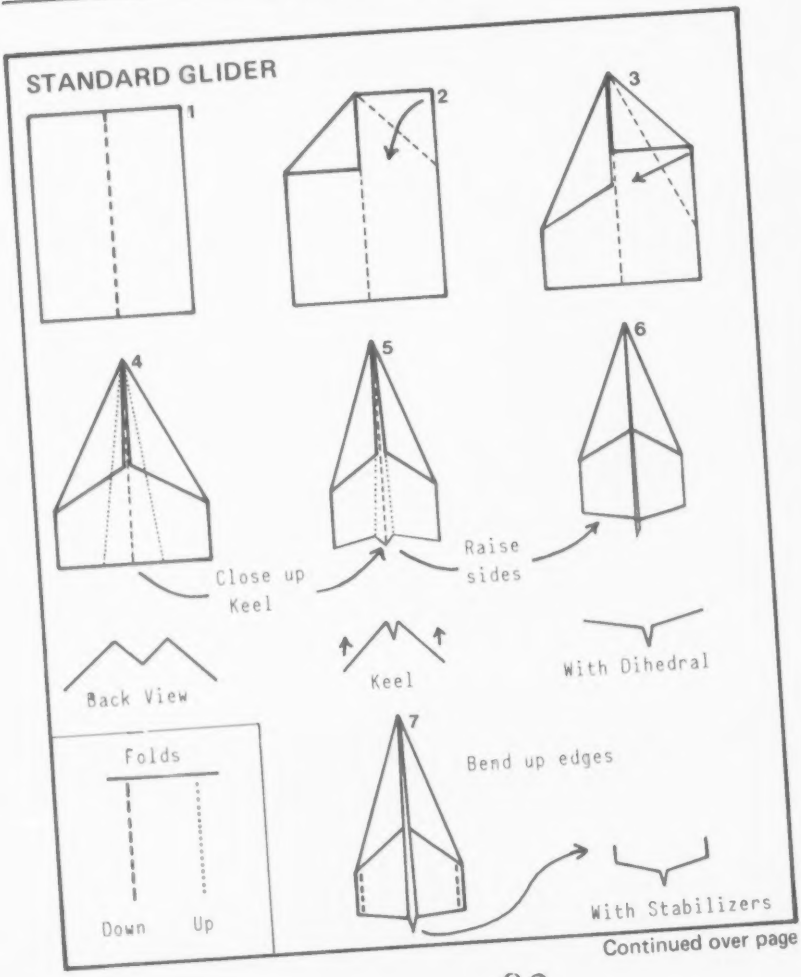
This heater works even in winter. Here are some ways to make it work even better.

1. Lay the bottom sheet on an insulating material, for example, straw.
2. Use a longer hose for the coil and paint it black.
3. Use an extra 'hothouse' layer of clear plastic a few centimetres above the top black plastic, making sure no breeze can get under it to blow the warm air out.
4. Build the heater on a board, and slope this towards the sun.
5. Slow down the flow of water or stop it while it heats inside the hose.

What would happen if

Paper Planes

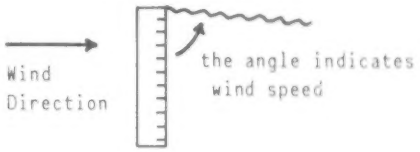
BY ROD MELDRUM



Continued over page

Activity

- Design a standard model from which modifications may be made. Test this model for the time that it spends in the air. Is it always the same? What influences its success? Wind speed may be measured using a stick or ruler and some string.



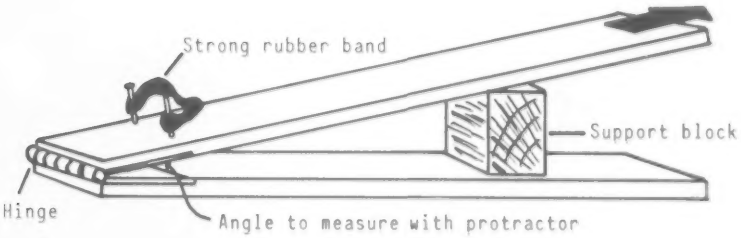
- These are some of the variables that students can test:

  length of the glider;
  paperclip attachments;
  thickness of the paper;
  method of launching the plane.

- Children will soon realise that accurate measures for these tests are almost impossible. It is often more desirable for children to conduct a number of test flights and calculate or estimate the average for each variable.

- Once variables have been tested the children can design planes using their own ideas and materials to develop maximum time in the air or distance.

GLIDER-LAUNCHING CATAPULT WITH ADJUSTABLE STRIP



From Macdonald Science 5-13, *Science From Toys*

OURSELVES

BY ROD MELDRUM

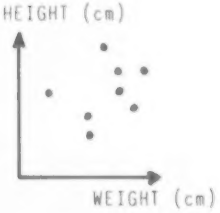
A simple and interesting method to begin a science program is for the children to study themselves. The following ideas are just a few of the activities suggested in the Macdonald Science 5/13 unit **Ourselves**. It provides a wide range of activities suitable for all primary and infant classes.

SOME IDEAS:

1. Measure the heights of the children. Encourage the shortest and tallest people to measure the heights of their parents and make inferences from the results.

2. Measure children's heights sitting in a chair. Can you tell from the results which children have long legs?

3. Explore the correlation between height and weight.

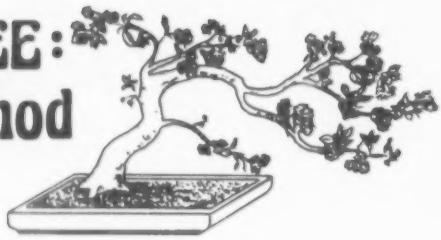


Can you identify tall skinny people from the scatter diagram?

4. Devise a method to find out how much skin you have.

5. How strong is your arm? Is there a relationship between length of arm and your strength?

BONSAI A TREE: The Quick Method

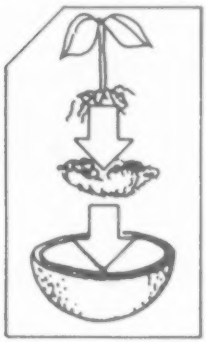


BY ROD MELDRUM

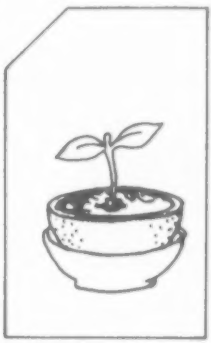
Bonsai trees develop dramatic shapes as a result of severely limiting their growth. A plant's growth can be limited by reduced space and warmth, excess water, or by being eaten. To create a bonsai tree you behave like a very choosy animal, nipping off roots and shoots.

Equipment:

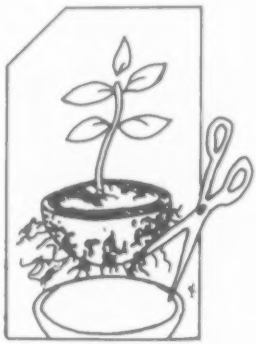
tree seedling, soil, half of an empty grapefruit, bowl, scissors.



Bonsai is never very speedy, but you can see results faster if you grow your tree in half of an empty grapefruit.

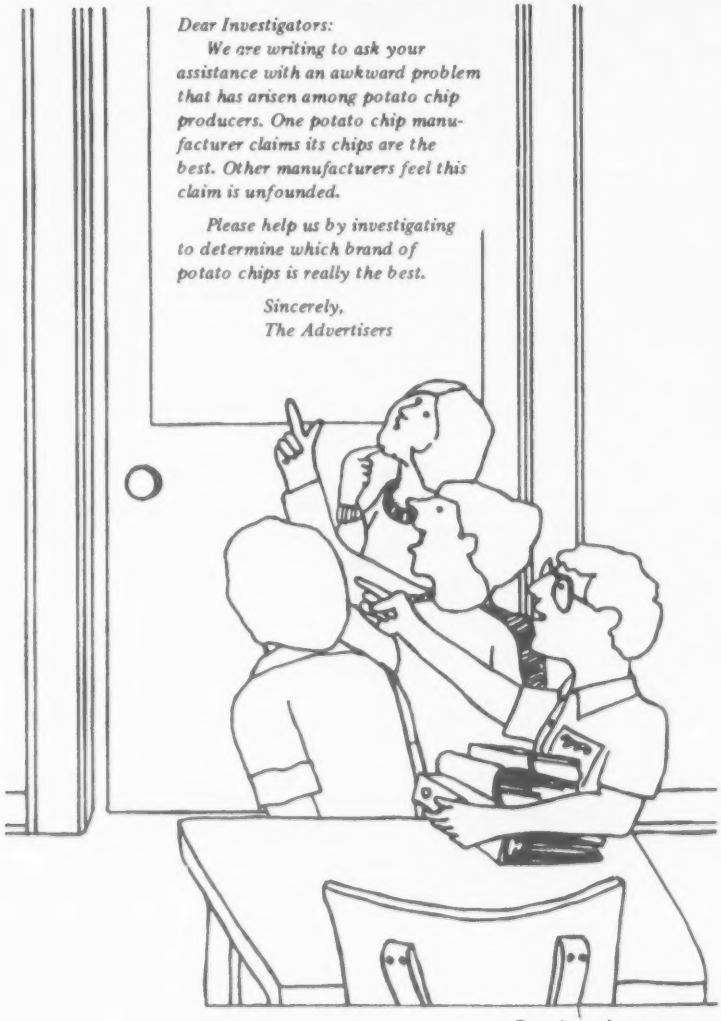


1.Assemble your seedling, moist soil and grapefruit.
2.Sit the whole thing in a bowl and keep it moist but not sopping.



3.Every time a root tries to grow through the grapefruit skin, snip it off. Remove the stem tip bud too.

Investigating - A Method To Start Investigation


Dear Investigators:
We are writing to ask your assistance with an awkward problem that has arisen among potato chip producers. One potato chip manufacturer claims its chips are the best. Other manufacturers feel this claim is unfounded.
Please help us by investigating to determine which brand of potato chips is really the best.
Sincerely,
The Advertisers

Continued over page

Dear Investigators:

Because of the increased use of computers, we are initiating a program to train computer technicians. An important requirement for good technicians is quick reaction time. Some people say men react more quickly than women. Since many women are applying to this program, it is necessary to determine the validity of this belief.

Would you please investigate to determine who has the quicker reaction time, men or women?

Sincerely,
Computer Technicians Institute

Dear Investigators:

Recently there has been an increase in the number of restaurants featuring salad bars with vegetables that must be kept chilled. This results in an increased need for ice. Most restaurant owners do not want to invest money in new ice-making equipment.

Would you please investigate to determine if there is a way to speed up the production of ice by adding certain substances to the water?

Sincerely,
U.S. Restaurant Society

Dear Investigators:

I am about to build a house and I would like to know the best type of bricks to use on the weather side of the house.

Can you design a test to determine how much water a brick will hold and how quickly it is released?

Sincerely,
Homebuilder

Dear Investigators:

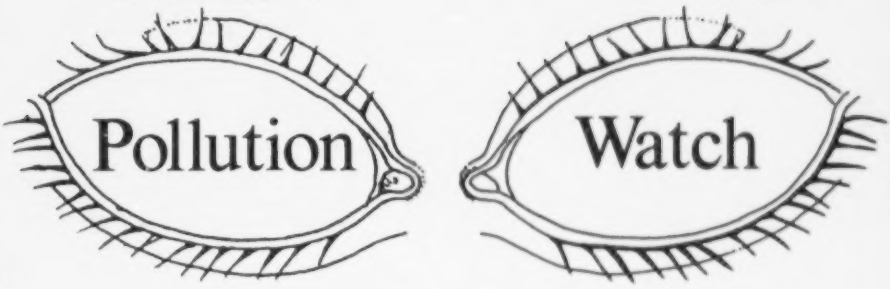
We are about to construct a new road system in a previously uninhabited area. Due to the need for the greatest efficiency with a modest budget we must know the most appropriate type of earthmoving equipment for this area's rock structures.

How do we determine the hardness of rocks?

Sincerely,
Acme Earthmovers

BY PAM HARRISON

What would happen if *Number 9*



BY ROD MELDRUM

You can find pollution within walking distance of your school - it may be solids, liquids, gases or smells that you find unpleasant.

* Make a Pollution Map of your local area and include sights, sounds and smells that you don't like. You can mark on your map any factories, busy roads, dumps, creeks and littered areas that are polluting or polluted. Make a key for your map to show polluted areas.

* Can you Measure Pollution?

  -a- Noise Pollution may be measured by observing the recording level indicators on a portable cassette player (for the purposes of comparison).

  -b- Dust Pollution can be measured using a shallow layer of gelatine or jelly in a saucer (make sure it is not raining!). You can compare the dust deposits in different areas over time.

Continued over page

POLLUTION MAP

You can draw an environmental map like this, or xerox an existing map (at your local library perhaps) and fill in your notes over it.

Water temperature 9°c. Found small fish, 3 water lice, 1 caddis fly larva, 4 freshwater shrimps and 3 sludge worms in sample.
Powdery green Pleurococcus only in Cemin Park – no true lichens
Marsh area. Birds nest in part of it, but a rubbish tip is taking over
Local meteorological station (they're very helpful here)
School
Home Dust rated medium – no lichen on Local & Etc
ICI Cement factory
Many young trees on this estate are already broken
Paint factory
Toy making factory. Very dusty
Library and museum
Busy noisy road – dust sample rated high
River Fleet
Power station
Rubbish tip; soil acid compared to a sample from the park.
Water temperature 13°c. Sample included 12 sludge worms, 6 blood worms, 3 water lice.
Sewage farm

Further Reference

Botanic Action with David Bellamy, Smallman and Bellamy, Hutchinson Aust.

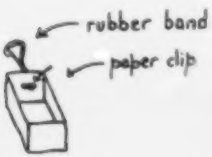
HOW MUCH MORE FORCE OR ENERGY DOES IT TAKE TO MOVE A HEAVY OBJECT COMPARED TO A LIGHT ONE?

FROM CONTACT, FEBRUARY 1983

MATERIALS:

shoe boxes and paper clips
pencils (round ones are better)
or dowel rods
heavy weights or books
rubber band assortment
metric ruler

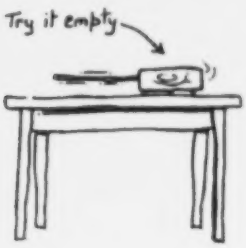
Attach the rubber band to the shoe box so that it can be pulled along a table top.



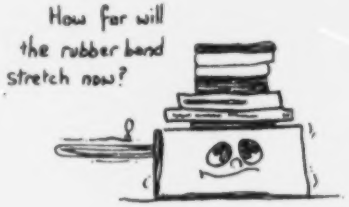
Make a small hole in one end of the box. Pull the rubber band through the hole. Put a paper clip through the rubber band on the inside of the box.

Measure how far the rubber band will stretch with the box empty.

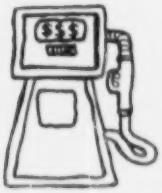
Continued over page



Fill the box with some books or weights and repeat the experiment.



Put some round pencils or dowel rods under the box. Try pulling it now.



Summary question:

Why do heavy cars use more petrol than light cars?

OTHER IDEAS TO EXPLORE:

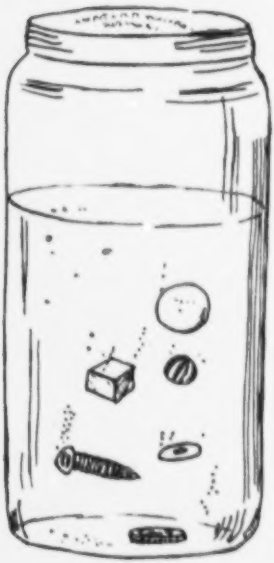
Try pulling an empty wagon with a rope. Try pulling it while someone sits in it. Is there much difference?

BEST COPY AVAILABLE

SCIENCE IDEAS

From PRIMARY EDUCATION
Vol 12, No 4, June/July 1981

Here are some starting points for a unit on liquids. The ideas are designed to encourage an investigation of how objects move in liquids.



You will need a screw-top clear glass bottle or jar, various objects (marbles, coins, cubes, screws) and different liquids (water, cooking oil).

- *Does the marble move differently when there is no air in the bottle?*

- *How do the shapes of objects in bottles of liquid appear different than they do in the open air?*

Continued over page

- *What are the shapes of bubbles as they travel from one end of the tube to the other? Are the shapes different in different liquids?*

- *Will different objects (coin, cube, screw) travel at different speeds?*

- *How long does it take the marble to travel from one end of the bottle to the other after the bottle is turned upside down?*

- *How much faster or slower does the marble travel in such liquids as water or cooking oil?*

Using Space Relationships

From Science and Children Nov/Dec 1981

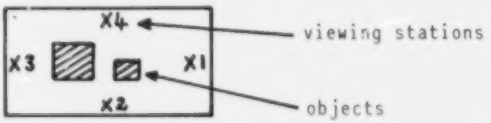
AIM: To see how objects relate to each other in space.

1. Take two similar objects of different dimensions and set up a table (Fig. 1). [More than 2 objects indicates a greater degree of difficulty.]

Fig. 1

2. Have children arrange themselves at 4 (or more) viewing stations around the object. (Fig. 2)

Fig. 2



3. Have children discuss exactly what they can see at each viewing station. N.B. They should note that their perception of the object changes at each station.

4. At the next level of development the children could draw the 4 different views of a set of objects and give the drawings and the objects to another group. This group should arrange the objects in the manner suggested by the drawings.

5. Introducing top view as a fifth perception increases the degree of difficulty of the space relationships.

FROM CONTACT
DECEMBER 1982

WHAT COLOUR

MATERIALS

4 juice cans
Spray paint: white, black, green and red (or any other contrasting colours)
Hot water (close to boiling) *
4 thermometers Food colouring

* TEACHERS DISCRETION

Paint each can a different colour.
Fill each can with the same amount of hot water (at least 40 degree C)
Add black water to all cans. (mix drops of all colours together to get black)
Put a thermometer in each can.

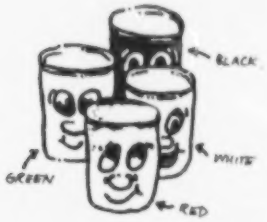
Record the water temperature in each can.

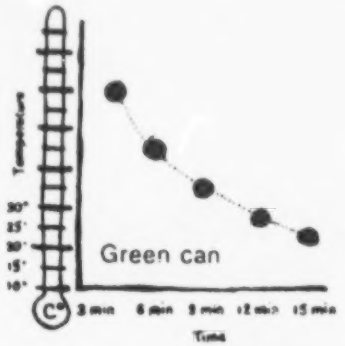
colours	starting temperature	3 min	6 min	9 min	12 min	15 min
white						
black						
green						
red						

Record the temperature every 3 minutes until the water cools to about 20 degreeC.

HOLDS HEAT LONGEST?

Make a graph of the results for each colour.

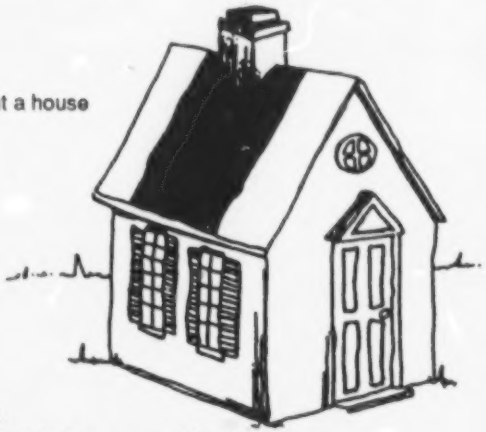




Which COLOUR held heat best?

SUMMARY QUESTION:

What is the best colour to paint a house to keep it warm in winter?



OTHER IDEAS TO EXPLORE:

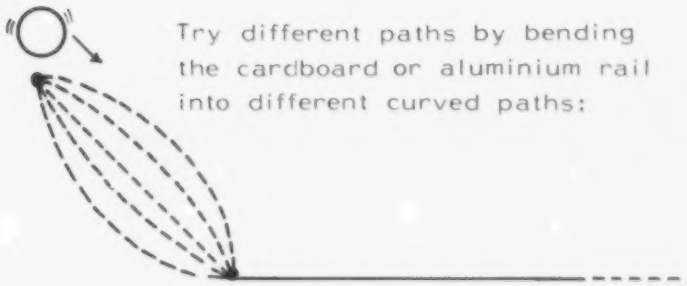
Which cup of coffee will lose heat faster - a cup of black coffee or a cup of coffee with cream in it?

MORE & MORE MARBLES

BY ROY PALLETT

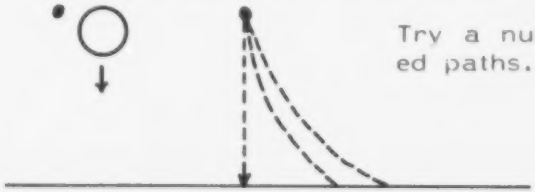
IS A STRAIGHT LINE PATH THE QUICKEST WAY TO TRAVEL BETWEEN TWO POINTS?

Use some corrugated cardboard or aluminium curtain rails to make the following tracks:



Try different paths by bending the cardboard or aluminium rail into different curved paths:

c) How much quicker does a marble drop straight down than along a curved path?



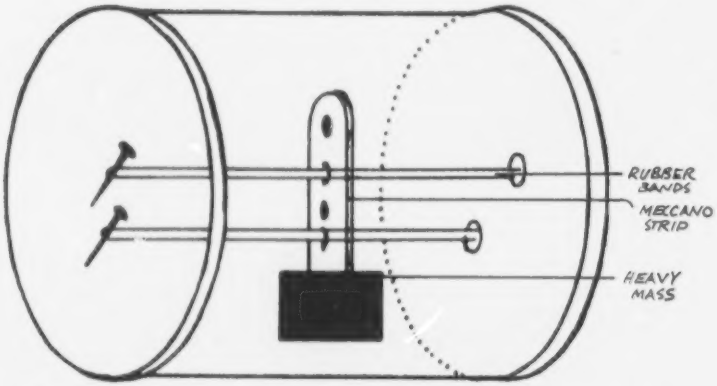
Try a number of curved paths.

A Return Roller

THIS IS A DESIGN - MEASUREMENT ACTIVITY
relating to forward push and length of return

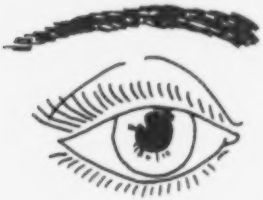
Note: Mass is variable.

For this fun activity you need to make a toy drive using a tin can, rubber bands and a heavy mass. When rolled along it will return.
Try it, and work out why the toy returns.



Blinking

1. Use a sampling technique to collect data.
2. Collect, record and interpret the data.

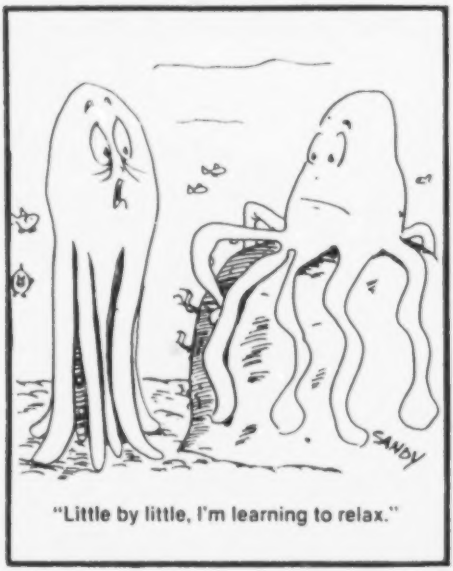


PROCEDURE

- One way to find out how often people blink is to watch everyone and record the number of times they blink over a period of time. Since it is impossible to do this for all people, and even difficult as well as time-consuming to do it for all the children in the room, a sample of children should be selected.
- Pose the problem with the children, and discuss why a large sample would give more accurate results than a small sample. Decide upon the size of the sample. (Ten children would be satisfactory). Decide also on the length of time to watch each member in the sample. (One minute, for example.)
- Since it is likely that people blink at different rates when doing different things, a good time to observe and record is when they are all doing the same thing, for example, listening to a story.

- When collecting the data, children will need to work in pairs - one to time and one to observe.
- Once all the members of the sample have been tested, calculate the average number of blinks per person made in one minute.
- The children could then be invited to use their results to determine how many times they blink during one day if they sleep for 10 hours.
- Children could also investigate whether their blink rate depends on what they are doing.
  Note: Blinking is done automatically by the eye, to keep the cornea moist.

Primary Science Sourcebook, Year 5
Education Department, Queensland.



"Little by little, I'm learning to relax."

Press and Display Seaweeds

How often do you take your class to the beach and look only at shells or rock pools? On many Tasmanian beaches the richest source of teaching materials is usually ignored. Seaweeds offer an amazing diversity of form and colour for use in a variety of science and art type activities.

1. Collection

Don't try to collect seaweeds at high tide. Half tide or lower gives a greater scope for collection. Small buckets or plastic bags can be used for collecting. Ask each child to collect at least six different varieties and you will be surprised at the range of seaweeds on one beach. Ideally the best collecting time is the next day after a storm. This means that a lot of the red and brown varieties from deeper water will be washed up on the beach.

2. Pressing

a. Wash sand from the seaweeds.

b. Separate the seaweeds to show the different varieties.

c. Pour up to 5cms of clean tap water into a flat tray or dish. Plastic tote boxes, large icecream buckets or trays, water play trolleys or baby baths will do.

d. Select a seaweed for pressing and place in the water.

e. Slide cartridge paper or similar thick paper

under the seaweed. Do not use poor quality paper as it tends to disintegrate when wet.

f. Spread the branches (or filaments) out to display the branching patterns. Knitting needles are usually required for this task. You will probably need fine pointed scissors at this point to cut extra branches from the seaweed. Removal of branches allows the remaining part of the seaweed to be flattened onto the paper and the branching pattern to be clearly seen.

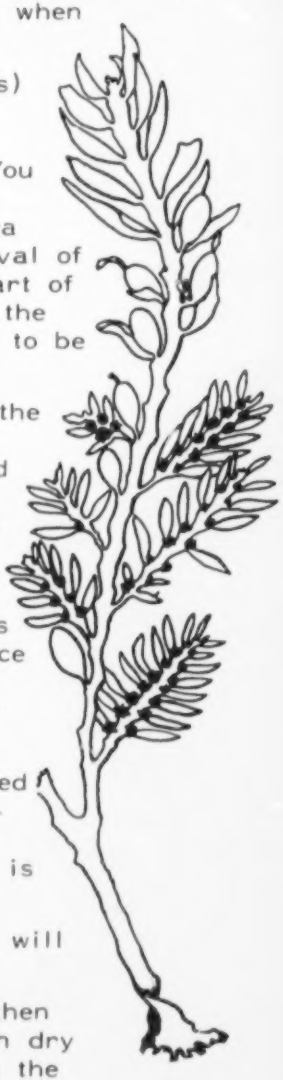
g. After separating and displaying the branches, slowly remove the cartridge paper with the attached seaweed from the water. If this is done too rapidly, the seaweed will be washed from the cartridge paper.

h. Place the cartridge paper and its attached seaweed on a flat surface and then cover the seaweed with cheese cloth or gauze (or similar cloth - preferably cotton).

i. Place the cartridge paper, seaweed and covering cloth between newspapers and press beneath heavy weights (if a proper plant press is not available).

j. Get rid of extra seaweeds - they will 'pong' if left in classroom.

k. Leave this for 2 or 3 days and then replace the newspapers with fresh dry newspapers. If you don't do this the seaweed becomes mouldy.



Continued over page

1. Leave the seaweeds between the papers for about two weeks.

This procedure is best used with filamentous or leafy red, green or brown seaweeds. The big brown seaweeds are best preserved by drying them in full sunlight.

BY ROY PALLETT

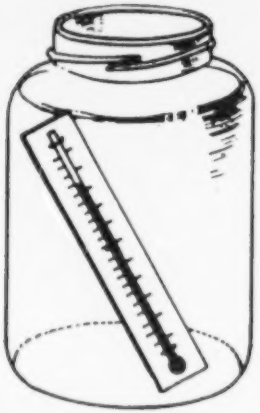
Solar Energy

This article encourages students to ask questions and explore everyday events and objects.

1 Put a thermometer in a glass jar of water. Set it in a corner of your classroom - out of the sun - until the temperature is constant. Now put the jar in direct sunlight. How much does the temperature change? How fast does the temperature change?

2 Would the temperature change be the same if you put the thermometer into an empty jar? Higher? Lower?

3 If you added food coloring to the water would the temperature change be the same? faster? or slower?



4 If one side of the jar were painted black and turned away from the direction of the light, would the temperature change be affected? What if the jar were painted all black? All white?

5 Would results be the same if you used a plastic instead of glass jar?

6 All the activities are heating experiments and may be affected by the time of day. How could you control this time variable?

7 Heat energy is only one of many forms of energy. Mechanical energy - energy of motion - is another. Could solar energy in the form of heat be transformed, at least partly, into mechanical energy? Devices which do this are called "heat engines". Can you think of examples of heat engines? Can solar energy be converted into electrical energy?

Science and Children
October, 1979.

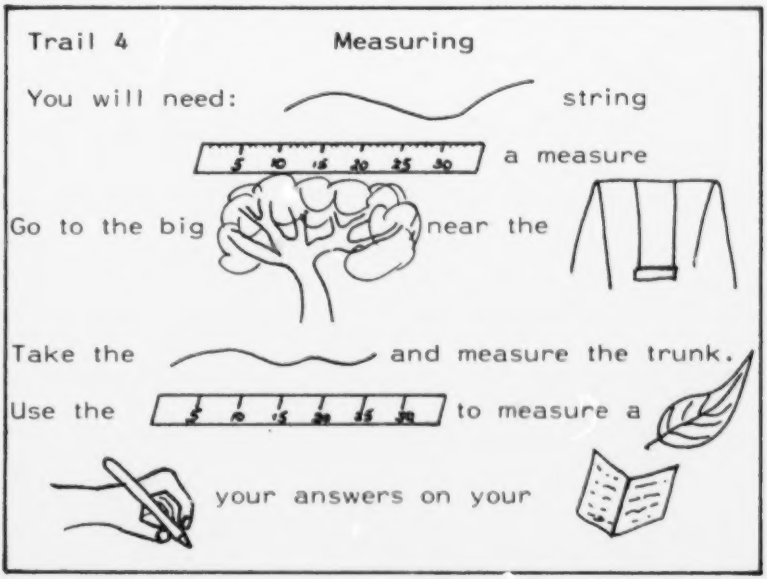
Rebus Task Cards for the Poor Reader

BY PAM HARRISON

Children who are poor readers learn best by working with concrete materials, thinking about what they are doing, and sharing their experiences. For science teachers to modify the necessary language to the child's level of understanding three methods can be used:

1. recording directions on cassettes;
2. pairing a poor reader with a good reader;
3. rebus; i.e. substituting pictures of things for the graphemes that constitute a word or part of a word.

An example of the rebus method.

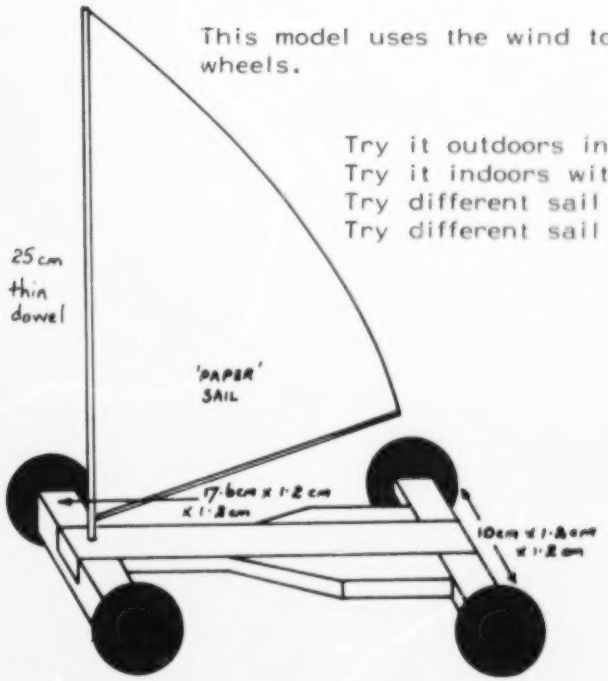


Rebus can be used for task cards, particularly those giving work directions for outdoor activities at child-based learning areas and environmental trails.

A LAND YACHT

This model uses the wind to drive the wheels.

Try it outdoors in the wind.
Try it indoors with a fan.
Try different sail sizes.
Try different sail shapes.



Bicycles

From: Science in
a topic - Energy

The 'safety' bicycle was so called because the wheels were made smaller. This meant the rider was not so far from the ground and did not fall off so easily. The rear wheel could now be driven by chain-drive.

A modern bicycle still uses the chain-drive.
Look at the chain and cogs of a bicycle.
Count the number of teeth on the pedal wheel.
Count the number of teeth on the back wheel.
Turn the pedal wheel once.
How many times does the back wheel turn?
Look for a pattern.

A table like the one on the opposite page will help.

A Number of teeth on pedal wheel	B Number of teeth on back wheel	A÷B	Number of turns of back wheel for one turn of pedal wheel.

Look at a bicycle with a gear change.
Repeat the counting and measuring for this bicycle.
How many teeth does the top gear-wheel have?
How many teeth does the medium gear-wheel have?
How many teeth does the low gear-wheel have?
How many teeth does the bottom gear-wheel have?
What difference do the gears make?

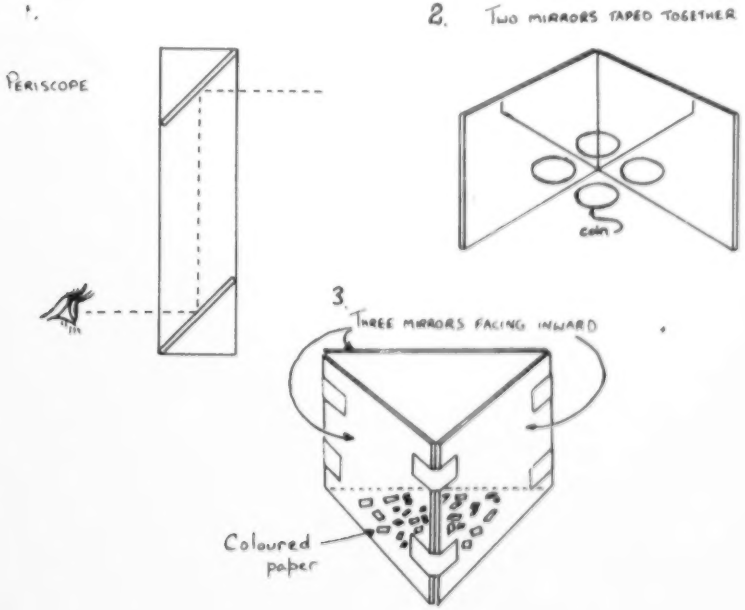
A		B		A÷B	Number of turns of back wheel for one turn of pedal wheel
Number of teeth on pedal wheel		Number of teeth on top gear			
"		Number of teeth on medium gear			
"		Number of teeth on low gear			
"		Number of teeth on bottom gear			

Try to obtain old cycle or motor-cycle gears to take apart and explore.

mirrors

Primary Science Sourcebook Year 4
Education Department, Queensland

1. Make a periscope.
2. Tape two mirrors together and position as shown. Place a coin between the mirrors. How many coins do there appear to be? Move the mirrors and note the effect.
3. Use three mirrors to form a triangle. Place small pieces of coloured paper inside the triangle and look down from the top.



1/9

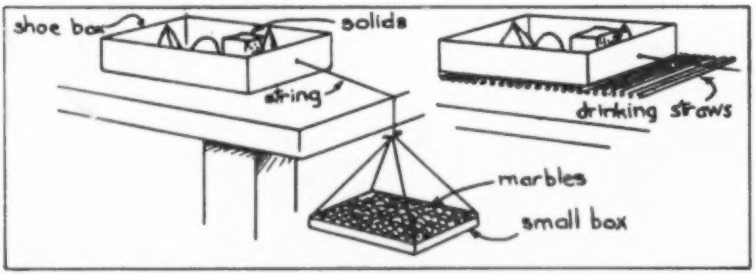
PREDICTING

Her are some simple ideas to give young children experience with prediction.

ACTIVITIES

A. Place some solid shapes in a shoebox and pull it along a table. For younger children it is easiest to attach one metre of string to the shoebox and the other end to a flat pan or shoebox lid, which hangs over the table edge. Add marbles (centicubes, etc.) to the pan until the shoebox moves.

Have the children predict the number of marbles it will take to move the shoebox?



B. Put the shoebox on some drinking straws. Now how many marbles will be needed to pull the box along now?

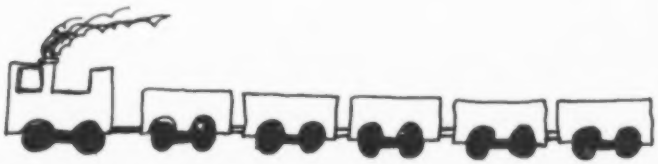
BY PAM HARRISON

Train Set Science

BY ROD MELDRUM

Train sets can provide a range of interesting scientific problems and activities. Here are some starting points for investigation:

- What distance does the train travel?
- How fast does the train travel? (Children could compare the speeds of 'wind-up' and 'electric' trains.)
- Devise a test to find out how pulling weights will effect the speed of the train.
- Where does the energy come from to drive the train? (It may be useful to discuss energy chains.)
- How does a transformer work? How does the electricity 'get' to the motor?
- How are real trains powered? (steam, diesel, electric.)



ART

Shadow puppets
Silhouettes
Candle making
Stained glass windows
Making reflectors

SOCIAL SCIENCE

Forms of lighting through the ages
Inventors - lightbulb, telescope, television, etc.
Manufacture of glass
Lighthouses

MATHS

Symmetry
Measurement of shadows
- relative to time of day, seasons
- shadow sticks

Reflections
Transformation
Light years
Angles of reflection and refraction

LIGHT AND SHADOWS

LANGUAGE

Drama - Theatrical
- Use of light, colour
- Shadow puppets

Oral - Reporting
- Debates

Written - Creative writing
- Poetry
- Legends

SCIENCE

Colour - Prism
- Kaleidoscopes
- Rainbows
- Spectrum
- Colour mixing

Optics - Lenses - reflection, refraction, magnification
- Laser beams
- Photography
- Glass - transparent, translucents
- Study of human eye, compound eyes, optical illusions

Effects of light on - plants,
- animals

Visual Aids - T.V.
- telecommunications

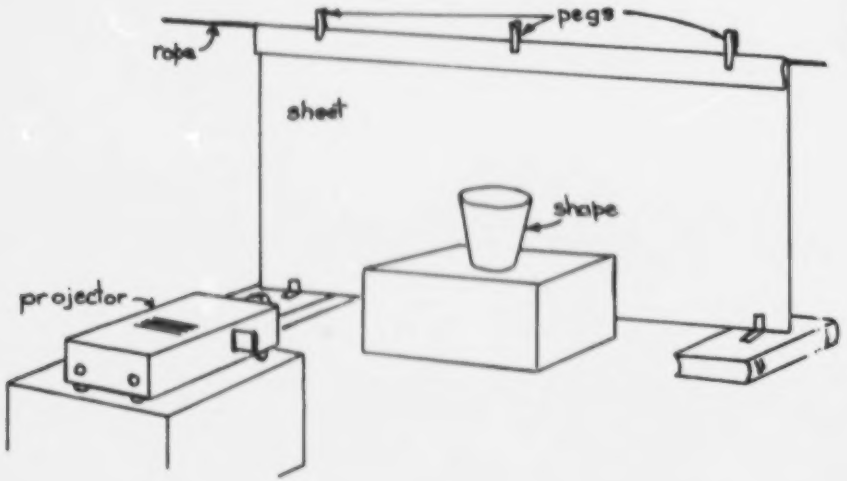
Astronomy - eclipses
- use of stars for navigation
- satellites
- telescopes
- periscopes
- Rotation, revolution seasons, day and night

Electricity - Solar cells
reflectors
production of light

BEST COPY AVAILABLE

SHADOWS

1. Observe shadows cast by various 2D shapes and 3D objects.
2. Infer which objects cast a particular shadow.



PROCEDURE

Set up a white sheet, a table and a lamp or projector as shown in the diagram.

Place a disc and a sphere side by side on the table behind the screen (to help support them, stand them in plasticine). Slowly rotate both objects. Have the children describe and compare the shadows they see on the screen of the turning disc and the turning sphere. They should note that the sphere always makes a circular shadow but the disc does not.

Use other objects and observe the change in shadows that they cast when rotated.

Have the children handle several three-dimensional objects (such as cubes, cylinders, prisms) and infer the shape of the shadows these objects might cast. Some children might make drawings to illustrate their inferences. Let the children verify their inferences by placing the objects in the light beam and rotating them so that they cast shadows on the screen.

The children may play a game by looking at the shadow cast by an unknown object and trying to infer what it is. They will find they need to see more than one shadow cast by the object to be able to infer accurately. Some familiar objects such as paper cups, plates, books, can be used in the game. Encourage children to give reasons for their inferences.

EXTENSION IDEAS

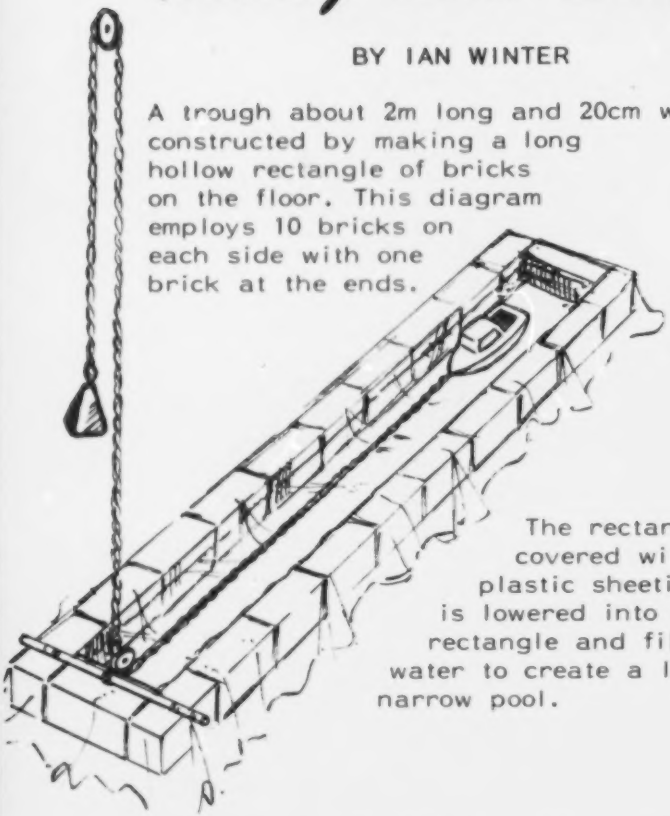
1. Children build shadow clocks (sun dials).
2. Children devise activities which show how shadows can be lengthened and shortened.
3. Group the children in threes and see what different shadows they can make in the playground, e.g. Can you make a shadow with six arms? Can you get your shadows to shake hands without touching your hands together?
4. Have the children stand outside a window. Say to the children: "Does your shadow go through glass? Are there any other things your shadow can go through? Try some and see."

Reference: *Primary Science Sourcebook Year 3, Dept. of Education, Queensland.*

Testing Boat Shapes

BY IAN WINTER

A trough about 2m long and 20cm wide can be constructed by making a long hollow rectangle of bricks on the floor. This diagram employs 10 bricks on each side with one brick at the ends.



The rectangle is then covered with thick plastic sheeting, which is lowered into the rectangle and filled with water to create a long, narrow pool.

Pulleys are arranged to allow the boats to be drawn across the water - one pulley at the level of the water, a second about $2\frac{1}{2}$ - 3m above the floor (on the ceiling).

The boats are pulled along the water by weights suspended from the high pulley and timed between 2 points by a stopwatch.

Questions:

1. Which shape moves more easily?
   (Watch out for variables such as weight and water contact area.)
2. What is the relationship between speed of boat and weight used from second pulley?
3. How does oil or soap or salt in the water affect the speed of a boat?

Other test areas

1. Does the condition of the bottom of the trough affect the speed - smooth or rough?

MATHEMATICS/SCIENCE RESOURCE LIBRARY

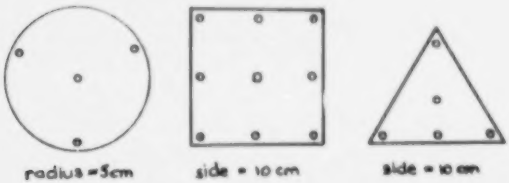
Our collection is now included in the Education Department library which is housed on the lower ground floor 71 LETITIA STREET NORTH HOBART.

The library is open to teachers from 9.00am to 5.00pm Monday to Friday including school holidays.

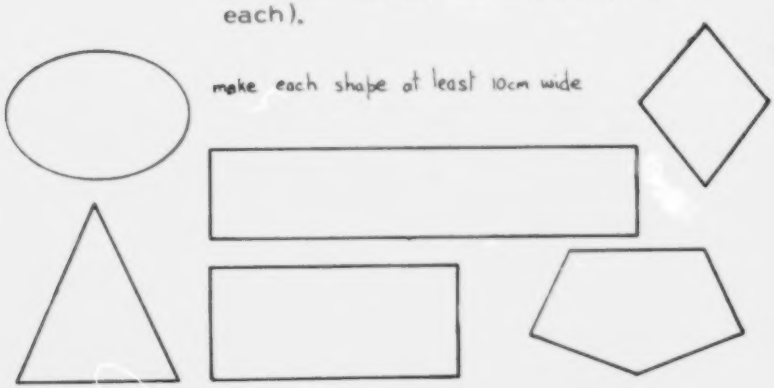
Balancing Regular Shapes

MATERIALS

Per Group: drawing pin;
wooden ruler;
cardboard shapes with punched holes, as shown (1 of each);



regular cardboard shapes, no punched holes, as shown (1 of each).

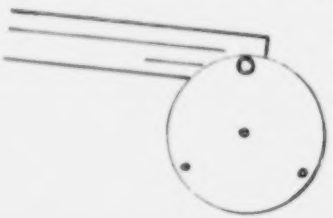


OBJECTIVES

Children: Locate the point of balance of various shapes by trial and error.
Predict the point of balance of other regular shapes.
Test their predictions by spinning the shapes about the predicted point of balance.

PROCEDURE

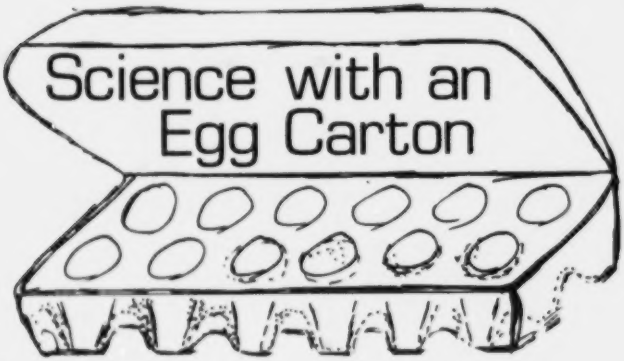
Children use a variety of cardboard shapes in which holes have been punched (around the edges and at the centre). With these they try to locate the centre of balance of each shape. They do this by pushing a drawing pin through one of the holes in the shapes onto a ruler, as shown. The shape is balanced when it spins evenly.



Ask the children:
What do you find when the shapes are spun by the holes around the edges?
Where is the point of balance located in each shape?

Using the knowledge they have gained so far, have the children predict the point of balance of various other regular cardboard shapes (no punched holes).

Then have them test their predictions by spinning the shapes as before.



BY PAM HARRISON

Empty egg cartons can provide an opportunity for children to practise such science skills as observing, classifying, making inferences, measuring and communicating data.

Observe

- the number of colours;
- number of capital letters;
- the letters of the alphabet not on the carton;
- the numbers on the carton;
- the price;
- the expiration date;
- what happens when you scratch the carton with your fingernail?

Classify

- How many ways can a number of egg cartons be divided into two groups based on one property?

Measurement

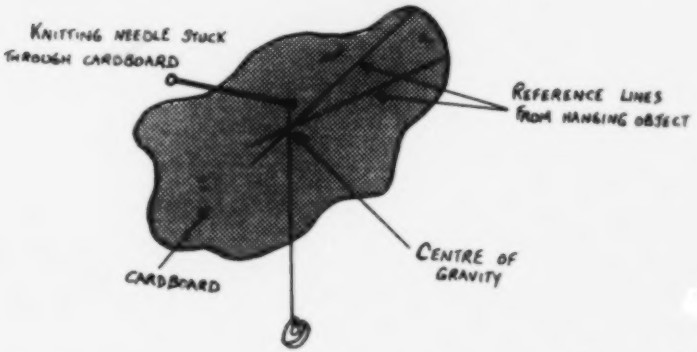
- Practise using metric dimensions by measuring egg cartons.
- How does the size of the egg cups compare for small, medium and large eggs?
- Does the egg carton support more, the same, or less mass before crushing when it is right side up as compared to upside down?
- How long will your egg carton float in water? In water you have added salt to?
- What is the mass of one empty egg carton?
- How many marbles does it take to balance one egg carton mounted in a pivot in the non-centre position?

Infer

- What happens when 5ml of water are put in the carton? Why?
- How does the ice cube melting rate compare inside and outside an egg carton?
- What happens to a magnet's strength when used from inside an egg carton?
- Which types of shops sell cartons of eggs?

How To Find The Centre Of An Irregular Plane Object

Rolland B. Bartholomew



Have you ever tried to find the centre of gravity of an irregularly shaped piece of cardboard? If you can find the centre, the cardboard can be pinned to a wall and it will stay in any position you place it. For example, you'll be able to change your bulletin board every day by simply rotating the cardboard. Also you may want to mount the cardboard horizontally on a post so that it will be balanced. Being able to find the centre of gravity is the key.

Use a knitting needle or similar object stuck into the cardboard (see figure). Hang a weighted line from the needle. Mark the line on the cardboard. Now rotate the cardboard and repeat the process. As shown, the lines will intersect at the centre of gravity of the cardboard.

To be sure your lines are accurate, place the knitting needle at the intersection point. The cardboard should be stable on all vertical

configurations. Also, the cardboard should balance in a horizontal position. Try it and see.

There are many activities you can do with this setup. If you're teaching about colours, the "colour of the day" can be rotated to the top and it will stay there. Maybe you'll have the students paint weather scenes on the cardboard and rotate the board to show today's weather at the top. Let your imagination work and you'll find many uses for a piece of cardboard mounted at its centre of gravity.

Science and Children,
April, 1980.

THE ASPHALT

Equipment: clipboard, paper, pencil, hand lens, hoop or length of string, piece of chalk.

Method:

1. Describe the feel of the surface of the asphalt.
2. Complete a rubbing of its surface.
3. Are there shadows? Describe their shapes.
4. Are there any cracks? What grows in them? What caused the cracks?
5. If you can, find a puddle and draw around it in chalk. Observe it later in the day. What has happened?
6. Place a hoop or circle of string on the asphalt. List all the living and non-living things inside the circle.

Small creatures

Observe:

1 Shape, colour, size of collected creatures.
2 Specimens under lenses, microscopes.
3 Movement on different surfaces. Which parts move?
4 Shape, colour, size of nests, webs, honeycomb, eggs, larvae, cases, casts, skeletons, etc.
5 Pond life — shape, colour, size, movement, etc.

Measure:

1 Trace length of creatures — build blockgraphs.
2 Time taken by spider to spin web.
3 Count type and number of small creatures collected on creature hunt.
4 Distance travelled by creature in given time.

Inquire:

1 Where found?
2 What do they look like?
3 What can they do?
4 How can we keep them?
5 Are they friends or foes?
6 Can they see, smell?
7 Are they sensitive to noise, light, etc.?
8 Set up a wormery in transparent (darkened) containers. Which environment preferred — sawdust, soil, sand?
9 Which foods do snails prefer?

Record, Communicate:

1 Sketch, label, chosen creature observed.
2 'Blob' paintings to make symmetrical creature.
3 Make a web from thread.
4 Papier mache creature.
5 Collage of 'mini-beast'.
6 Labelled chart: My Creature.
7 Display of collected creatures.
8 Spiral shapes — collect shells, snails, etc., make patterns using spiral shape.

Predict:

1 Where to look?
2 How to look?
3 What to keep them in?
4 What signs of life do they leave?

Infer:

1 Collections of creatures should be done carefully, sensitively.
2 Many live on host plants, for example, caterpillar — cabbage, grubs — fungi, aphids — vegetables.
3 Each has different food requirements.
4 Some are meat eaters, others are plant eaters.

Classify

1 Group according to colour, shape, movement.
2 Group according to habitat, for example, under stone, on leaf, in water, etc.
3 With/without wings.
4 In the ground/above the ground.

What would happen if

BEACH ENVIRONMENT

OBSERVE

Erosion - banks, foreshore
Traces, remains of animals on rocks, in shells, on the shore
Smells of the sea, shore
Sounds
Man's intervention in beach environment

MEASURE

Temperature in the air, in the sea, in rockpool
Tidal movement during visit
Transect of a rock pool -plant, animal life
Distance travelled by crab in 30 secs etc.
Changes in wind direction
Lengths, widths of crab claws etc.

INQUIRE

How animals use camouflage for survival
How animals rely on tidal movement for food etc.
Weather patterns
Wind directions, sea movement
Interdependence of plants and animals - set up sea aquarium
Sponges - characteristics, habitat
Arthropods - characteristics, habitat

PREDICT

Animal life from tracks, droppings, remains etc.
Food sources for various sea animals
Recent weather
Reasons for erosion, sand deposits

RECORD, COMMUNICATE

Rubbings of rocks, shells
Geometric shapes of plants, animals
Life cycle charts of sea animals e.g. crab, seagull
Graph changes in sea aquarium
Display labelled collections of shells
Press and display plants, including seaweeds
Sketches of collected seashore plants, animals

CLASSIFY

Classify collections of seashells, seaweeds - colour, size, texture, shape
Rocks sorted according to colour, texture, shape
List vertebrates, invertebrates
Animals under rocks
Animals on or attached to rocks

INFER

All crabs are sensitive to light
All crabs are sensitive to sudden movement
Crabs cast off shells as they grow
Seabirds prey on living creatures in the sea
Tides are regular movements of the sea

Number 11

BEST COPY AVAILABLE

NUTRITION ACTIVITIES

YEAST

To make good bread, yeast is added to the flour and water.

What is yeast? What does it do in bread making?

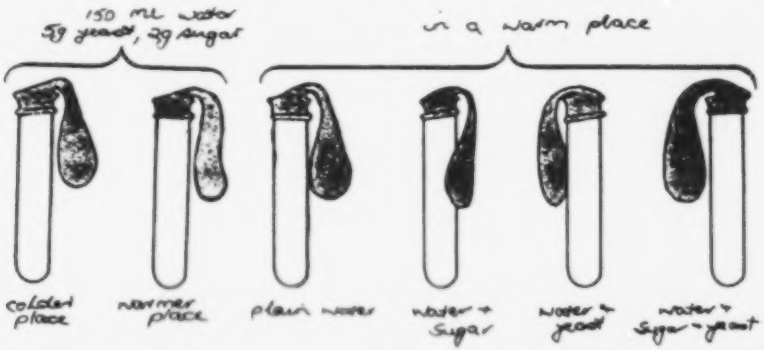
Look closely at some yeast.

Put a teaspoon of sugar in a test tube. Half fill the test tube with warm water. Add a little yeast.

Stretch a balloon over the neck of the test tube.

Watch what happens, after five, ten, fifteen, thirty, minutes, one hour, two hours.....

Set up these tests. What happens in each case?



Smell & Taste

1 Try some breadmaking and experiment by changing the recipe.

Predict what would happen if you:

a left out the yeast;
b used twice as much yeast;
c left out the salt;
d kept the dough cold before baking.

2 People often say that when they have a cold they cannot taste. Did you find smell affected some of your tasting experiements?

Do we also taste with our nose?

Try tasting while holding your nose.

a Eat a piece of raw potato, a carrot, a piece of apple, a slice of pear, a banana.
b Try sipping different flavoured drinks; lemon, grapefruit, orange.
c Suck a chocolate, a sugar lump, a mint.

Which of these things were difficult to taste when you could not smell them.

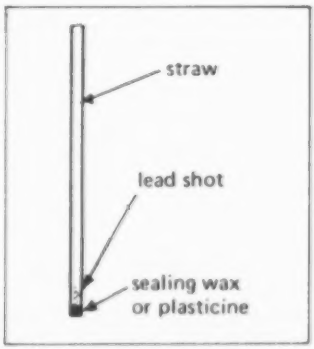
Try tasting one thing while smelling another, for example, tasting apples while smelling curry powder.

3 Do some research to find how cold affects taste. Suck an ice-cube before a taste experiment.

TESTING MILK

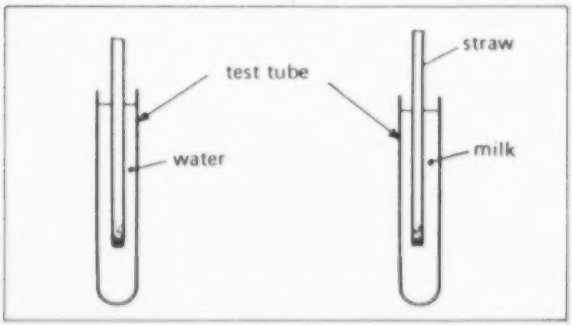
Milk is tested to make sure that it is pure and of good quality.

Here is a test that can be used to find out if milk has been watered down.
Try the test for yourself:



Make a floater

Mark how your floater sinks in water and in milk.



Ask a friend to prepare different samples of milk, some watered down. What can your floater find out about these samples?
Test different kinds of milk with your floater.

TESTING FOR FLAVOURS

Flavour three containers of milk but add some "unusual" colours, for example:

banana (add green colour)
vanilla (blue colour)
pineapple (red colour)

Predict what flavour is what:

by LOOKING
by SMELLING
by TASTING

How accurate were your predictions????

"One medium rare alfalfa, one whole wheat, one barley....hold the rye".

Taken from 'Science in a Topic'

Suggested Contents for a Unit Box on MAGNETS & MAGNETISM

BY: Pauline King

COLLECTED:

Materials to place between a magnet and attracted object: card, paper, hard-board, a biscuit tin lid, plastic sheet.
Materials to test metals: (steel, iron, copper, brass, tinplate, tin, zinc, lead, bronze, aluminium, nickel) sponge, wood. stones, plastics, chalk, rubber, card, string.

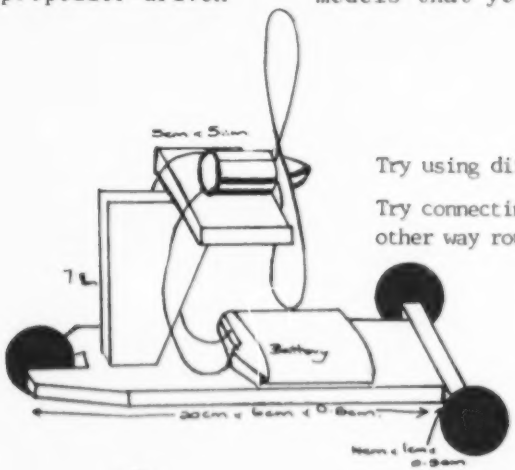
Objects to test: drawing pins, paper clips, screws nails (including iron), coins, paper fasteners, a school badge, a tin can, small nails, panel pins.

PURCHASED:

Iron filings (The pattern formed by iron filings under the influence of a magnet can be fixed by using hair lacquer spray or by using clear self-adhesive film.)
Magnetic compasses; plotting, pocket, mariner's, survey, compass needles, compass needle stands.
Magnetic games; magnetic robot, magnetic computer book, cat and mouse, whisker face.
Magnets; bar, cylindrical, horseshoe, disc, button, ceramic, minni-magnetic rubber, lodestone.
(A range of different magnets rather than a set of one type will provide much wider experience and offer more opportunity for investigation.)
Metal discs, metal rods, small nails, panel pins.
(These are more useful than the convential iron filings - they can be counted, weighed, hung as a necklace and do not cover the magnets in whiskers.)
Steel strip (for making magnets).

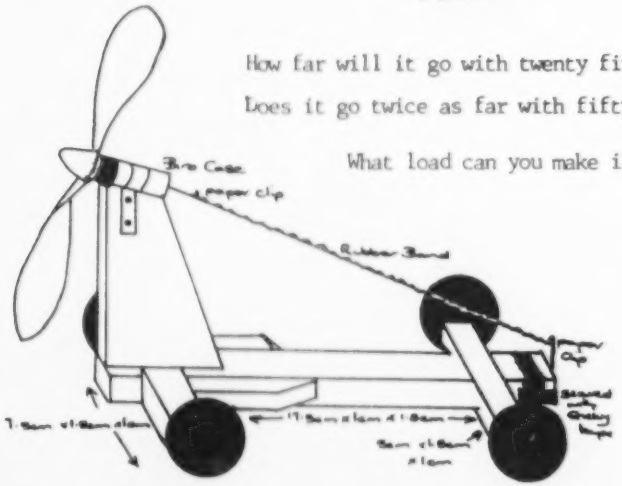
PROPELLERS

Many machines are moved by propellers. Here are two propeller-driven models that you can make.



Try using different batteries.

Try connecting the battery the other way round.



How far will it go with twenty five turns?

Does it go twice as far with fifty turns?

What load can you make it pull?

BROKEN OBJECTS ARCHAEOLOGY

DEVELOPING INFERRING

Ian Pattie

Any broken object may be used as a means of developing the skill of **inference** making.

1. Let the children work in pairs so that they may discuss their inference.
2. Give a broken object to each pair of children.
   (NB The more complete the object, the easier the inference.)
3. The children should look carefully at the object to collect **evidence** as to the size and shape of the original.
4. Children should draw the original full size.
5. If possible, a clay replica should also be made.

Cup handle,

141

Building and structures

– Rod Meldrum

Buildings and building sites present a wealth of challenging problems and tasks. These are some starting points for investigation:

- What materials are used to make the walls of houses?
  Children can compare their properties in terms of the conduction of heat or sound. The class could collect bricks, timber and plasterboard and devise tests to measure the conduction of heat.

- Make a brick collection in the classroom. Note differences in length, width, height, volume, surface area, colour, texture and shape.

- Which bricks are most likely to be waterproof? Children give reasons for their judgement and devise a test to measure how much water bricks absorb.

- Make your own bricks, using clay and/or mud. Measure and weigh the bricks before they dry out.

- What is cement and how does it work? What ratios of sand to cement to gravel are used to make different types of concrete? Children could concrete and mortar a rock bed for the school grounds.

- How do people insulate their homes? Children can devise tests to measure the insulating properties of different materials.

FURTHER REFERENCES

McDonald SC 5-13 Derbyshire cards: Structures and Forces, Buildings and Bridges.

STRAW FLUTE

You will need:

1 Straw Tooter,
Sharp Pointed scissors
Paper Straws

What To Do:

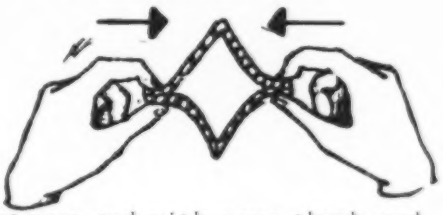
1 Take a straw tooter that works well. Make a few little holes along the top with sharp pointed scissors. Start the holes at least 2 cm. from the end you blow into. Don't make the holes very big or the straw will break.

2 Hold the flute gently between both hands. As you blow, cover and uncover the holes with your fingers and you should get different notes on the one instrument.

3 What sound would you make if the flute were twice as long.

SNAPPERS

Straw tooters and buzzers belong to the woodwind instruments. A straw flute is another woodwind, but a snapper belongs in the percussion section.



You will need:

2 Paper Straws

(1) Take two paper straws and with your thumb and fingers, flatten them along their length. Hold the straws together at the ends with the thumb and forefinger of each hand. Push your hands towards each other so both straws bend outwards at the middle

(2) Now pull your hands apart quickly and the straws should come together with a snap.

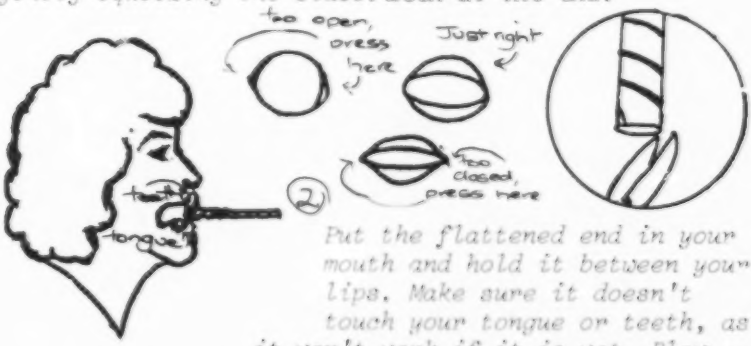
(3) What would happen if the length of the snappers were changed?

STRAW TOOTERS

You will need!

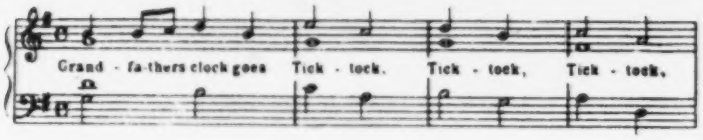
Paper drinking straws. Plastic is often too stiff, but try it. Sharp scissors.

Make sure the straw you use has a clean neat end. Hold this end between the tips of your thumb and fore-finger. Pinch it flat for about a centimetre, this may make it too flat, if so open it out by gently squeezing the sides. Look at the end.

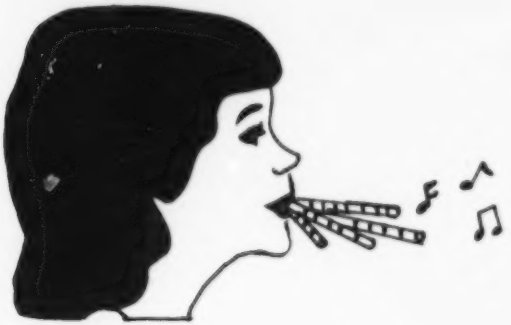


Put the flattened end in your mouth and hold it between your lips. Make sure it doesn't touch your tongue or teeth, as it won't work if it is wet. Blow hard and you should get a note. If you don't, adjust the flattened end until you do. It sometimes helps to cut off the corners.

7. Grandfather's Clock



What would happen if *Number 12*



MORE TO DO

Make several tooters of different measured lengths. Which give high notes and which give low notes? Why?

Put several of different lengths in your mouth and blow very hard. You should be able to make noises like car horns and train whistles.

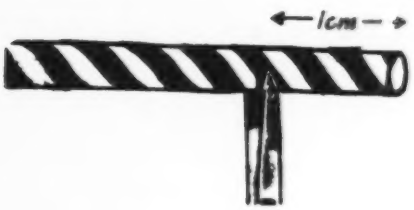
You can make other instruments out of paper straws, for example, paper straw buzzers.

Find a xylophone or piano and make a tooter to match a given note.

STRAW BUZZERS

YOU WILL NEED

Paper drinking straws, sharp pointed scissors.



(1) Choose a straw with a neat clean end. Cut three quarters of the way through the straw. About 1cm. from the end. Use scissors with sharp points.

(2) Turn the straw so this cut is on top. Cut from the same end of the straw, down the middle to meet the first cut. open this end section out into a flap.

(3) Bend the flap back and forth a few times so that it bends easily. Check that there are no loose bits of paper in the straw or hanging from the end. Fold the flap down so it nearly closes the straw. Breathe in at the other end of the straw and the flap should vibrate.

④

If it doesn't buzz, check the troublespots. If it does, it will work even better if the flap is trimmed to make it smaller. Don't play it by breathing in. It is safer to put the flap end in your mouth and blow. Don't let it get wet or it won't work.

You can make different sounds by blowing harder or softer, and by opening and closing your hands over the ends of the straw.

WHAT HAPPENS IF:

the flap clamps shut?

the flap won't buzz?

148

Evaluation

10/10

✓

Generally the most suitable form of evaluation is the incidental and subjective evaluation that is done during the course of a learning unit.

PUPIL ASSESSMENT

Checklists for Skills and Attitudes - a 5 point scale from left to right indicating degree of development.

Skills

OBSERVING					
MEASURING					
INQUIRING					
RECORDING					
INFERRING					
CLASSIFYING					
PREDICTING					
INTERPRETING DATA					
CONTROLLING VARIABLES					
EXPERIMENTING					
HYPOTHESISING					

Attitudes

CURIOSITY					
CO-OPERATION					
PERSEVERANCE					
RESPONSIBILITY					
INDEPENDENCE					
PROBLEM SOLVING					

Questions to be asked of the pupils:

a) Does she/he exhibit initiative?
b) Does she/he persist with science tasks?
c) Is she/he flexible in problem solving?
d) Can she/he suspend judgement?
e) Does she/he generate questions on her/his own?

Evaluating Science is not considered to be a high priority, however, in response to teachers' requests the above scheme is offered as one way of assessing pupils.

****

The above information is obtained from:

"Looking Through Science: Formulating a School Policy", MacDonald Educational, 1981